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A Plan on Every Farm	*Soil Conservation*	1
One Answer to Farm Tenancy	*Farm Science*	4
The Brand	*The Cattleman*	8
Cross-bred Performance	*The Farmer*	12
New Findings in Poultry Feeding	*Farm and Home Research*	14
Sudan Grass for Hog Pasture	*American Hampshire Herdsman*	20
Fruitwood is Famous for Its Quality	*American Fruit Grower*	22
Chemical Soil Poisoning Termite Control	*Western Farm Life*	24
Spraying Sheep with DDT	*The Dakota Farmer*	25
Turkeys—Large or Small?	*The Rural New Yorker*	28
England Faces the Future	*The Michigan Farmer*	31
What Makes Machinery Wear Out?	*Successful Farming*	35
Saving Grain on the Farm	*Marketing Activities*	39
New Type Sawdust Concrete	*Pacific Rural Press*	43
New Barns Out of Old	*Holstein-Friesian World*	44
Silage Comes Tumbling Down	*Ohio Farmer*	46
Synthetics for Puny Pigs	*Capper's Farmer*	48
Polish Peasant Becomes a Farmer	*Poland of Today*	51
How Soils Nourish Plants	*PhilFarmer*	54
Harvesting Badly Needed Native Grasses	*Seed World*	58
$300 a Ton for Hay Sold to Soil	*Montana Farmer-Stockman*	61
Feed Protamone	*Hatchery Tribune*	65
Making Water Wetter	*American Forests*	69
Film Seals in Freshness of Fruit	*Florida Grower*	71
70% of Milk from Good Roughage	*American Agriculturist*	73
Water for Thirsty Vegetables	*New England Homestead*	75
Stop Gullies—the Easy Way	*Farm Journal*	79
Why Prove Herd Sires?	*The Shorthorn World*	81
Grass for Mid-Summer Use	*Pennsylvania Farmer*	88
Biographical Sketch of Dr. Carver		91
Farmer's Library Page		93
Index		95

The Farmer's Digest

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A Plan on Every Farm

Condensed from Soil Conservation

Herbert R. N. Boddy

To the Sauvie Island Soil Conservative District goes the distinction of being the first district in the country with 100 per cent farm planning. By the fall of 1946 the board of supervisors was able to announce that all 96 district farmers, operating 16,726 acres, had a farm conservation plan working for them. That is a record that will stand until challenged.

"Our best soil conservation advertising is a complete land use plan in operation," says Omar Spencer, chairman.

The little farming community of Sauvie Island, located 8 miles down the Columbia River from Portland, Oreg., is only a dot on the map. For more than a century dairying has been the island's chief enterprise.

Today Sauvie farmers are turning thousands of acres of drained lake-bottom land to the production of record cash crops.

Says Spencer, "When farmers reported good results from complete land use plans their neighbors requested similar plans. By citing nearby examples of successful farm practices we spread the gospel of soil conservation to every farm in the district. We won the doubting Thomases over by showing them, by actual practice, that conservation farming is best."

What to do about their problem of excess water was the question before the Sauvie supervisors when they gathered for a round-table meeting two years ago. Technicians of the Soil Conservation Service explained that drainage of the island's wet lands was prerequisite to getting other appropriate practices applied to the land.

How the district supervisors and farmers worked out the water problem is a prime example of district teamwork.

Until 1940, when 16 miles of dikes were built along the banks of the Columbia River and Multnomah Channel by the United

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States Engineers, three-fourths of the island's surface had been washed by seasonal silt-laden floods.

High waters reached their peak during spring freshets when the rising Columbia and Williamette rivers flooded much of the island's pasture land.

There were times when water on the ponded pastures was too high for grazing. On these occasions Sauvie dairymen moved their herds off the island to forage on the mainland.

Four years later, when the Sauvie Island landowners organized the soil conservation district, the surplus water problem was only partially solved. The levees protected the land from floods and the ditching job done by the Sauvie Island Drainage district helped drain it. Still, around two-thirds of the district continued to be either under water or waterlogged.

Working side by side with the supervisors, Service technicians outlined an over-all drainage program.

The farm drainage plans fitted into the over-all district work program. They also matched the pattern of the drainage districts.

On Sauvie Island, the drainage districts' main job is to keep the two main waterways clear—the 5-mile A-1 canal, the 8-mile Gilbert River, and other small main drains. The drainage districts also undertake to drain farm lakes when the water has a depth of 5 feet or more.

All other farm drainage work in the district is handled by the farmers as part of their farm conservation plans.

Farmers are assessed by the drainage district for their portion of the over-all district drainage cost. They are on a pay-as-you-go basis.

Work of the Sauvie Island Soil Conservation District and drainage districts is closely coordinated. All phases of the island's drainage problem are worked out cooperatively with supervisors of the soil conservation district and the drainage districts.

Service engineers laid out individual drainage plans as an integral part of each farm-conservation plan. They showed farmers how to construct ditches and how to use them to dry up lakes and wet lands.

Using equipment rented from the district office, Sauvie farmers completed 77 miles of ditches and drained around 10,000 acres of lowland by June, 1946.

Drainage is not the only use that farmers make of their ditches. Service technicians showed them how they could use them for irrigation.

It was demonstrated, for instance, that a 10,000-acre area could be drained by tapping the four fresh-water inlets built into

the levees. The main island waterways carry the water to the farm ditching systems.

Farm land went up in value from $75 per acre to $200 per acre after the drainage program got under way. But the change in agriculture is even more significant.

"Last summer's crop and dairy output was the island's best," explains Ronald B. Elmes, district conservationist. "Top yields were the general rule and many truck crops were raised on Sauvie Island for the first time in 1946."

Elmes said 3 to 4 tons of cabbages were the average output before the district was formed. Last summer more than 10,000 tons went to market. The sweet corn crop was stepped up seven times and production of potatoes was doubled.

Peppers, cauliflower, green onions, peas, and cucumbers were raised for the first time. The crop of cucumbers was 1,400 tons. Green peas average 1¼ tons per acre.

Dairying also improved. Drainage of old pasture land and the addition of new fields put the dairy farms on a sound basis. Herds are now sustained on less acreage due to use of better pasture management and seeding of improved grasses and legumes.

"The upswing in agricultural products on Sauvie Island has yet to reach its peak," Elmes said. "Our technicians have told the farmers that they may expect further increases in crop production next year and for some time to come. The farmers understand that production will increase as they continue to apply the practices set forth in their farm conservation plans."

Along with the drainage assistance given the district supervisors, Service technicians have helped farmers apply needed soil-improvement practices.

High on the list of practices carried out by Sauvie farmers under their complete land-use plans is their record in spoilbank spreading. Farmers have leveled a total of 312,700 cubic yards of ditch banks. Fifteen miles of ditches have been seeded.

District teamwork is spotlighted in the following two-year work summary:

Crop residue management, 6,780 acres; irrigation systems installed, 3,377 acres; noxious weed control, 6,330 acres; approved crop rotation, 3,140 acres; seeding of grasses and legumes, 937 acres. Fertilization, land leveling, and cover cropping round out the list of practices.

For the most part the practices applied by Sauvie farmers have been established on drained lake beds or waterlogged land.

Drainage continues to be the district's No. 1 job. Sauvie farmers apply agronomic practices as

fast as they can work their drained lands. They expect these land-building and soil-improvment practices to be in full force less than two years hence.

"Our supervisors," noted Spencer, "follow the policy of giving assistance to district members when it is needed. We go out on the ground with Service technicians, and talk things over with the farmer. We make a point to understand his soil-conservation problems."

The Sauvie board of supervisors have built up a substantial working capital from rental of equipment and farm implements. Around $6,500 has already been spent on purchase of equipment and farm implements. An additional $10,000 from district funds has been set aside to buy more equipment.

Spencer recently reviewed progress in the Sauvie district in this light: "Our district-wide drainage program, backed up with tested farm conservation practices, has developed a high level of productiveness on the island. Farm and community life has been stabilized and landowners are happy over their district's prosperous outlook."

One Answer to Farm Tenancy

Condensed from Farm Science

Howard Raid and Earl O. Heady

About half of Iowa's land is rented. Why is the percentage so large? You'd think sons of farm families would take over the home farm when they become of age.

Most farm families want to own their farms. That has always been the goal of the American farmer. Evidently the people have felt ownership was good. Our public laws have always encouraged the owner-operator system of family farming in America.

History and experience have shown the owner-operator farming system, under favorable circumstances, is both economically and socially sound for the community. Home ownership builds pride and security. Farm owners can weld their family life more closely to their communities and schools.

You can, of course, find many cases where tenant operation is best. Many young men could never start to farm without ten-

Reprinted from Farm Science, Ames, Iowa, July, 1947

ancy as a stepping stone. Often a landlord and a tenant can combine capital and "know-how" to do a better job of farming than if the tenant owned the place himself. We think that tenant-operated farms under favorable conditions are as efficient as owner-operated farms. But much of our tenancy is not of this desirable type. Many farms are rented in such a way that the result is poor farming methods and vast loss of soil resources.

Part of our tenancy problem hinges on the method by which farms are passed along within the family. Sometimes one of the boys of the family goes out and rents a farm, while at the same time the home farm is being rented by someone else. We wanted to learn more about what was behind this problem. So we studied an area in which tenancy was low.

We chose the Mennonite community near Donnellson in Lee County, Iowa. Almost 100 per cent of the farmers in this settlement have been owners down through the years. We included all farm operators in the settlement in our study.

Here is what we found: 85 per cent of the farms in the group are being operated by the second generation of the same family; 70 per cent for the third generation; and 54 per cent for the fourth generation. These figures normally would be even larger. However, the settlement is but four generations old. And some of the present farms have been added to the settlement area within the last generation or two.

There are several reasons why a farm passes from generation to generation of the same family in this Mennonite community. The family ties of these farmers are strong. They also place a high value upon farming as a "way of life." But the key reason lies in keeping the boys interested in farming. Young men have a chance to get started in farming.

Often the young man gets a share in the management and profits of the farm business as soon as he is out of school. Sometimes the son borrows his father's machinery to farm nearby rented land. Only 15 per cent of the boys have begun farming during the past 35 years other than these two ways. Naturally, by these two methods the boys develop an early interest in farming. They become well trained. And they start to earn and save money (capital) at an early age.

There's always the problem of who gets the home farm if there is more than one boy. The Mennonites often solve this by having the youngest son, or one of the younger ones, eventually take over the farming unit. This has certain advantages. The father is more nearly ready and

able to retire by the time the youngest son is ready to take over.

The older boy who waits for ownership has to operate another farm during the prime of his father's career. That means he must be a tenant for a time. He may not want to move back to the home farm later. If he does return, he or his father usually must sell all or part of their livestock and machinery.

In the group of farms we studied, most family farms were finally turned over to the son as a "going concern." The machinery and livestock were sold right along with the farm and buildings. That cuts out the need for breaking up established breeding herds, selling off machinery and similar tie-breaking transactions. The new owner has hope of an immediate income without big capital outlays. Time and money are saved because he does not have to select and organize the livestock and machinery all at once.

Often the Mennonites transfer the farm to the son during the period of the father's retirement and before he dies. This is important. The son can begin putting his long-range plans for organization and improvement into effect immediately. Society benefits because this encourages conservation of resources.

In some communities when a boy rents the farm until his father dies, he hesitates to invest funds in repair or land improvement. He not only stands to lose his original investment but must turn around and pay for it all over again when the estate is settled. In such cases, the buildings are often allowed to run down and the land to erode until the shares of the other heirs can be bought. Such a practice is wasteful for society.

When the farm was transferred before the death of the parents, retirement income was provided in various ways. Some sold the farm to the son and left the money in the farm or invested the funds in other business. Others used the cash from the sale of the farm as a means of livelihood.

Another method was to deed the farm to the new family operator with the proviso that the parents retain a life interest in the unit and receive the normal going rent. Others turn the title over to one of the children while taking a mortgage which bears interest until the parents' death.

A few farms were transferred as gifts to the sons. These transfers, however, took place only after the sons were married and had operated the farms successfully.

Wills were used to transfer some farms. But the most satisfactory wills were those which permitted the heirs to decide

which one was to take over the home place.

Many of the farms were transferred through the laws of descent. In actual practice this meant that the surviving parent had control of the farm until his or her death. However, if a married son wanted to buy it he usually could. The home place was kept until the parent's death only where there were a number of single children.

In several cases we found that the farm had been sold to a son for less than the going price. The remaining heirs were taken care of by other means. In still another case, the heirs themselves sold their interest in the farm to one of the sons at a price lower than the market price. They wanted to make sure that he got the home place.

Under a method used in still other communities, the parents transfer the farm to one of the children in return for a contract of support. Thereby, the son and his wife agree to furnish food, housing, medical care, burial and other expenses. A mortgage can be used to guarantee performance of the agreement. If the conditions of the contract are not met, the mortgage becomes due. If they are fulfilled, then the mortgage is cancelled at the death of the parents except for such payments as might be specified for other brothers or sisters. This provides a retirement income for the old folks from the farm, but still allows the next generation to assume active operation of the unit.

Such contracts should be written in exact detail. When drawn to avoid misunderstanding, this kind of arrangement has many advantages. The parents have a retirement annuity. The new operator can take over the business without restraint. And it can be arranged to give proper consideration for other members of the family.

Whether the farm be transferred within the family by will, gift or contract, the plan should provide for several things. It should encourage the improvement and conservation of the farm by the family member who takes over. It should guarantee adequate care for the parents during the period of retirement. And it must provide for satisfactory settlement with other family members. The agreement should be written so that all members of the family understand it.

The study of the Mennonite community shows that proper forethought and family planning can do much to cut tenancy and to improve soil conservation.

The Brand

Condensed from The Cattleman

John M. Hendrix

For more than two thousand years the fire brand has served mankind as a method whereby his livestock might be readily identified and title to it held sacred. Apparently, it had its origin with the Egyptian heliographics. In the interim, there has never been discovered a better method of establishing livestock ownership than the fire brand.

There may be instances where a mother cow reclaims or allows an overgrown calf to suck after weaning, but these are few and far between, and have little value in a court of law. Flesh marks may be indelibly branded in the minds of an owner and his family, but they are not so marked in the minds of a jury—especially if half a dozen hides of almost equal marking are introduced by the defense. The breeding of cattle of uniform color and markings has made this method of identification almost obsolete. Earmarks alone, due to the fact that they are subject to alteration, are not sufficient. With the brand, it is possible for the owner of one or two cattle to have the same advantage as the owner of large herds. During the years, the fire brand has been the means of restoring hundreds of thousands of dollars' worth of appropriated livestock to its rightful owners and in securing the conviction of thefts. It has also served as a means of identifying collateral offered to banks or cattle loan companies by ranchmen. In the conduct of such business, cattle are negotiable, and known only by the brands given in the chattel.

The fire brand came into Texas by the way of Mexico—doubtless of Spanish origin—in the seventeenth century. As the range cattle industry spread from Texas and the Southwest to every other range area of the United States, the general custom of branding, and with it the sanctity of the older brands, was established and thousands of others evolved. However, there is not probably a country nor a state in the United States where the custom of fire branding does not obtain. Even though it is an institution of great age and general adoption, there have been some few changes in the method of heating and using the branding iron. These changes might be of interest to the older ranchmen and some benefit to the new.

A high percentage of range cattle are branded upon the left hip or left ribs. Why? There is no definite reason given for placing the brand on that side, but it is

Reprinted by permission from The Cattleman, Fort Worth, Texas

generally practiced and is good protection to follow, as a majority of all cattle are branded upon that side. Occasionally, when there are a number of brands on the left side, a tally or holding brand may be on the right side—but this is the exception. Small brands and ownerships may have their brands on the right side because the first animals they branded happened to fall, when thrown, on the left side. Regardless of where it goes, it is essential and should be somewhere on the hide.

The size of the brand makes no particular difference, just so it is on uniformly. Uniformity of brand has a real value when cattle go into the mid-western feed lots, as they present a much better appearance. This applies also when it comes to inspection, for a bad or blotched brand may slow up an entire operation until the authenticity of the blotched brand is determined. The brand, for best legibility, should be applied with a grey hot iron, almost the color of ashes—never red hot, as that produces an overburned brand, one subject to hair burning and scabbing off a deep sore which is fruitful ground for flies and screw worms. An iron not hot enough burns a brand slowly, painfully, and is not productive of a brand that will hair over clean. Cattle should never be branded when damp, as it causes a scalded or blotched brand. If you have been around a branding pen or round-up when a shower occurred you have noticed that the boss will cease branding operations, holding them in abeyance until the cattle have thoroughly dried out, it may be a matter of hours or days, but he waits for dry hides.

The branding iron should be entrusted to the hands of the same men each year, as far as possible. They acquire a touch in putting the brands on and in gauging the temperatures of the iron, and can tell in an instant the temperature of one—whether it is too hot or too cold. Notice a good brander at his work, and he will wipe his iron through the dust if it is too hot, or request a new iron if it is not hot enough.

The general use of squeezers or branding tables is having a decidedly good influence on more uniform brands, and is coming into general usage, due to labor shortage. The long chute for hip or side branding is generally used for grown cattle. Uniformity of brands may be obtained by the use of the chute, provided the cattle are crowded into it so as to prevent moving about during the operation.

Calves should be branded as early as possible in the spring, with due consideration for the prevalence of flies and worms. In

the earlier seasons of the Southwest, and with the changes in the periods of breeding, many of the outfits have their first branding completed from April 1 to May 15. This is of particular value because the recuperative ability of the small calf is greater than in the older ones, and the shock of branding, castrating, dehorning, marking, and vaccination is not so great. The smaller calves recover rapidly from the effect of the operation, and within a couple of weeks are grazing contentedly with their mothers by the time grass has hardened and is most effective.

The type of iron used and the care of it has a great deal to do with the quality and uniformity of a brand. If you have noticed the chuck or "hoodlum" wagon of a branding outfit on the move, you will find that the irons have been carefully wrapped, with tops tied together and with the faces of the irons enclosed in an old oiled sack to prevent them from rusting or bruising. When a branding season is over, the irons are carefully put away in the saddle-house, again in an oiled sack, for it is not too easy to get good branding irons. The manufacture of a good branding iron is an art of the old cow-town blacksmith, who made a specialty of it, and it has been handed down, with modifications, to the moderns.

In recent years, many of the outfits have adopted a furnace or blower, some using a specially manufactured one and others nesting the flame of the blower in a nest of rock. These blowers may be especially built, but in the Southwest the pear burner type is more generally used, and requires only the occasional stroke of the pump to maintain a pressure sufficient to heat half a dozen irons. It may be carried in the lantern box of the chuck wagon. In the oil field country, a very practical furnace may be made from a 12″ to 18″ section of 10″ casing, in which three to five irons may be heated. The probable cost of such an outfit, including pressure burner, is $15 to $20. The use of this saves many blistered noses, faces, and hands, and requires only about half as many irons. Formerly, the branding pens or round-up grounds were served with branding wood by a ranch hand and two-horse team, who in the winter months would haul and stack wood against the summer branding. In the event this was not done, it fell to the lot of the horse-wrangler to cut and drag green wood as it was needed. The fire also required the attention of another man to keep it grey and the coals at a uniform heat which permitted hot irons.

The use of the pressure burner has proven an economy during the labor shortage—more especi-

ally in sections where wood is scarce. There is some complaint that its regular heat causes branding irons to deteriorate quicker. It is felt, however, that it offers advantages over the coal forge.

The branding iron should be made of the best quality of iron, of stock from one-half inch to one inch, with the face drawn and beveled to approximately one-fourth inch. Length, of handle should be about 36 inches, dependent upon the type of fire to be used. The letters or symbols should be at least four inches in height. The face of the irons should be kept free from dirt, rust, and burned hair at all times and should be kept "sharp" by an occasional filing. It is considered undesirable to use a small or horse iron in branding cattle, because of their size. The use of the small jaw brand is discouraged because of the fact that it must necessarily be small, and the face hair of an animal is inclined to fall down or curl around it making it indistinguishable.

A very necessary adjunct to the brand is its proper registration in the owner's name in the state and county in which it is used. In most range states, the function of brand registration is carried on on a state-wide basis, thereby making it impossible to have more than one brand of a kind within the state.

In Texas the registration is by counties, making it possible for the same brand to occur in adjoining counties with perfect legality. This custom obtains because of the fact that Texas was organized by counties, radiating from the colonial counties in the Southern portion of the state. Because of the size of the state, these were originally considered chunks of territory and covered a large area, often reaching as far as civilization had been extended. As new counties were organized, brand registrations were set up under the supervision of the county clerk. As time went on, many of these brands were discarded, became obsolete, or the owners died, leaving them on record, however. A few years ago, all brands in the state were ordered registered, still by counties. Those using old-time brands were given sufficient time to re-register. The result is a practically new brand registration for the state.

A brand in your mind, burned on a corral fence or neatly stenciled or painted on your station wagon, only, is of no value if you are interested in protecting your stock and cooperating with the agencies who have as their purpose the restoration of stolen cattle and the conviction of cattle thieves. Try as they may, the inspectors are up against a stone wall if your cattle are not branded and the brand properly registered.

Cross-bred Performance

Condensed from The Farmer

John Livingston

UNIVERSITY of Minnesota swine breeders, headed by Dr. L. M. Winters, showed several hundred farmers at the Waseca Swine Feeders' day that one more big step has been taken in learning what cross-bred hogs can do.

Commercial swine men swarmed over the grounds of the Southeast Experiment Station to see for themselves how the 250 hogs in the 21 lots had done to date in the experiment.

Many stopped at Lot 4 to look over an even bunch of cross-breds averaging 100 pounds of money-making gain on only 287 pounds of feed. The 13 pigs were raised from two litters of seven and eight pigs farrowed. Their average weight, farmers noted on the big sign tacked on the hoghouse, was 43 pounds at the 56-day weaning date. At 154 days, Lot 4 averaged 174 pounds. Their weight at 163 days was 191 pounds.

Lot 4 represented an M by 2M cross which means that a Minnesota No. 2 boar had been mated with the "M" line of Poland China hogs at the station. The cross-bred gilts from this mating had then been bred back to an "M" boar.

Other visitors were more interested in the size of Lot 5. Five pigs were farrowed in this lot and all five of the B by 1-M-1 cross were raised. At 56 days weaning date, this litter weighed 50 pounds. By 154 days, the five averaged 217 pounds and weighed 229 pounds at 164 days. Feed for every 100 pounds of gain in Lot 5 amounted to 344 pounds.

The three-breed cross in Lot 6 pulled a lot of farmers up to the fence for a look at the six-pig litter. This cross, V-1-2-V-1, is well into the fourth generaton of a rotational cross breeding program. At 56 days, the six weaned pigs averaged 33 pounds. The 154-day weighing date found them at 180 pounds. Ten days later the six averaged 194 pounds. Their feed rate was 322 pounds for every 100 pounds of gain.

There were only two litters from a cross of the No. 1 gilts with a No. 2 boar. The two litters had farrowed 13 pigs which were all raised to a 50-pound average at 56 days. At 139 days, which

Reprinted by permission from The Farmer, St. Paul, Minn., Oct. 18, 1947

was the day before the Swine Feeders' day, they weighed 181 pounds. Some of the best results in the past at the station have come from this No. 2 by No. 1 cross.

There were a lot of hogs to see, but to round out the picture the V x 1V1 cross should be mentioned. Seven pigs were farrowed, six were raised. Fifty-six days found them at 44 pounds average weight. The 154-day weighing tipped the scales for an average of 200 pounds apiece for the six hogs. This was done on 350 pounds of feed for each hundred pounds gain. A No. 1 sow was mated with a Viola-line boar. The cross-bred offspring was in turn mated to a No. 1 boar. The cross-bred from this second mating was bred to a Viola boar and the resulting gilt from this third mating will be mated to a No. 1 boar for a total of three matings to date toward the V x 1V1 cross. This is known among commercial hogmen as the "Criss-cross" system of cross-breeding, using only two breeds. University Farm breeders have recommended "Criss-cross" as one method particularly suited to communities where access to good boars is limited to just two breeds.

To demonstrate that these fast gaining hogs do not produce a fatty carcass, a barrow resulting from the mating of a C-line boar with a Minnesota No. 1 gilt was cut-out before the farmers attending the demonstration. The C-line is the result of six inbred Poland China lines which have been developed and then crossed to form the C-line.

The slaughtered barrow weighed 203 pounds at 134 days and, amazingly enough, gained an average of almost two pounds a day from the date of weaning.

The 74% cut-out on this hog was high compared to other good market hogs which generally cut-out on an average around 68 to 69%. The 74% represented the amount of meat going into the hams, picnics, Boston butts, loins, and belly or bacon from the barrow's cold carcass weight. Over 22% was ham; 20% was skinned ham; 17½% was belly or bacon. Another 17½% was loin and 12½% weighed out in fat cuts, which included the fat back, the plate and the raw leaf lard.

New Findings in Poultry Feeding and Management

Condensed from Farm and Home Research

D. C. Kennard and *V. D. Chamberlin*

Ohio Agricultural Experiment Station

POULTRY feeding and management is being profoundly affected by recent research results. Consequently, better answers to some of the older as well as the newer questions which follow are being obtained.

One of the oldest questions is whether or not chickens need hard grit (granite or silica gravel). The Station has endeavored to secure further information on the over-all question of hard grit from four different angles:

1. *Do chicks fed an all-mash starter need hard grit during the first 8 to 12 weeks?* No, according to the averaged results of 12 experiments with a total of 3,500 chicks which were fed a coarsely ground chick starter with and without hard grit, and seven experiments with a total of 1,840 chicks which received a finely ground chick starter with and without hard grit. In fact, the feed requirement per pound live weight was slightly less (2.5 percent) for the birds that did not receive granite grit. The rate of growth was the same with or without hard grit.

2. *Is hard grit needed for the growth of chickens after the first 8 to 12 weeks?* In three experiments involving a total of 2,800 birds, is was found that the birds which received coarse feed (including whole corn and oats) with granite grit made 6 per cent better gains with 7.5 per cent less feed per pound of gain than those that did not receive granite grit. No benefit was derived from feeding granite grit when the feed was finely ground.

3. *Do layers need hard grit?* The results of 4 experiments with 14 groups (or a total of 670 birds) definitely indicate that layers do need hard grit. Neither the limestone grit nor the oyster shell served as a substitute for granite or silica gravel grit. The use of the insoluble grit supplements in four experiments averaged 9.6 per cent more eggs with 7.1 per cent less feed requirement. This, considering the little additional cost of the insoluble grit, was a material saving in the cost of egg production.

4. *Since hard insoluble grit proved beneficial for layers, which was better — imported*

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granite or Ohio crushed silica gravel grit?. It will be of special interest to Ohio poultrymen that in three experiments the layers which received the Ohio crushed silica gravel grit averaged 10 more eggs per bird with 0.4 pounds less feed requirement per dozen eggs than did the comparable layers which received the imported granite grit. Of interest also is the fact that, because of the lasting qualities of the silica gravel grit in comparison to the granite grit, the layers required only about one-fourth as much.

Is limestone grit a satisfactory substitute for oyster shell? Yes, providing the limestone grit is prepared from P. F. G. (poultry feeding grade) or high calcium (90 per cent or more calcium carbonate) limestone. High magnesium or dolomitic limestones are highly objectionable for feeding layers.

Four experiments (two with Leghorn and two with Rhode Island Red pullet layers) were conducted in which the three groups of layers in each experiment received the free choice of oyster shell, calcite grit (N. J.), and P. F. G. Ohio limestone grit. The egg production in the four experiments averaged the same for oyster shell and calcite grit (N. J.); whereas, the groups that received the P. F. G. Ohio limestone grit laid 4.7 per cent more eggs. The feed requirements in pounds per dozen eggs were 6.77, 6.66, 6.55, respectively.

The percentages intake of total feed of the calcium supplements were 4.14 oyster shell, 4.61 calcite grit, and 4.36 P. F. G. Ohio limestone grit. Since the calcium carbonate contents of the supplements were 96.1, 80.6, and 90.1 and the calcium carbonate intakes were 3.98, 3.71, and 3.92, respectively, it is interesting to note that, despite the greater intake of calcite grit, the actual intake of calcium carbonate was less than that of the other calcium supplements. Since limestone grit is purchased on the basis of the calcium content, it is obvious that for the same price per hundredweight the P. F. G. Ohio limestone would be the most economical to use. The light color or crystal-like appearance of the calcite grit proved of no advantage over the gray-blue P. F. G. Ohio limestone, which might be supposed to be less attractive in appearance.

Which is the better method of feeding layers—the free choice of whole grain and mash, or the limited feeding of whole grain and mash? The answer to this question from the Station's Rhode Island Reds has been different than from the Leghorns, although the limited feeding of whole grain has yielded the best averaged results from both breeds. The Leghorns did the

best at balancing their ration when given the free choice of whole grain. More feather picking and cannibalism, however, was experienced with both breeds when given the free choice of whole corn and oats.

Free-choice feeding of whole corn, whole oats, and a mash is a popular procedure and is successful with a considerable number of poultrymen, especially those who feed moist mash or supplement the mash with liquid or condensed skimmilk or buttermilk or pellets. Whenever egg production is unduly low or when too much trouble is experienced with feather picking and cannibalism with the layers, one of the first causes to suspect is too much whole grain and too little mash. If the protein intake from both the whole grain and mash is less than 15 per cent, this should be regarded as a likely cause and should be corrected first of all.

May corn-and-cob meal be substituted for whole and/or ground shelled corn rations for feeding chicks and layers? In starting and growing rations with Leghorns and Rhode Island Reds, much the same results were secured in three experiments from rations containing the same amount of ground shelled corn.

The use of 31 to 37 per cent corn-and-cob meal to substitute for a like amount of ground shelled corn in rations for layers in five experiments yielded an average of 7 less eggs per bird than did the ground shelled corn rations. The feed requirement of the corn-and-cob meal rations (not including the cob meal) averaged 4.23 pounds less per bird. On this basis the pounds fed per dozen eggs was 6.21 for the corn-and-cob meal rations and 6.30 for the ground shelled corn rations. Obviously, when all of the different factors are considered, there was little difference between the results secured from either corn-and-cob meal or ground shelled corn in the five experiments.

The sixth and seventh experiments conducted with Leghorns and Rhode Island Reds (1946-47) are the first in which the corn-and-cob meal rations have exceeded the ground shelled corn rations in egg production. Maybe the explanation for this is that these were the first experiments in which rations were prepared on the basis of equal content of total protein (by use of additional soybean oil meal) rather than on a pound for pound substitution of corn-and-cob meal (8 percent protein) for ground shelled corn (9 percent). Consequently, there was a slightly higher protein content in favor of the ground shelled corn rations in the first five experiments.

The feed requirement (not including the cob meal) per dozen

eggs in the seven experiments averaged 0.24 pound less for the corn-and-cob meal rations. In each of the seven experiments, the average body weight of the layers which received the corn-and-cob meal rations was slightly less (0.19 pound) than that of the birds which received the ground shelled corn rations. There was practically no difference in the percentage of mortality.

In all of the experiments, the feather condition of the layers receiving corn-and-cob meal was noticeably better than that of the layers receiving the ground shelled corn rations, even when these rations contained 20 percent of total feed as whole oats. Likewise, the corn-and-cob meal proved superior to oats as a preventive of feather picking and cannibalism.

This may prove timely and important information at this time with reference to the use of corn-and-cob meal as a substitute, or at least as a partial substitute for oats in view of the prospective scarcity and higher price of oats in some sections during the coming year. From the point of egg production alone, the use of corn-and-cob meal will often prove as/or more economical than the use of whole or ground shelled corn, especially if the corn-and-cob meal is fed as a part of an all-in-one, 16 to 17 percent protein feed mixture with no feeding of additional whole grain.

Just what feeds are actually necessary for satisfactory growth of chickens having access to good pasturage? After seven years of extensive experimental work, it appears that a definite answer to this important question may be near at hand. The experiments included the feeding of whole grain without mash; the free-choice feeding of whole corn, whole oats, and a special range mash; whole oats-mash, all-in-one feed mixtures; and latest of all and perhaps the answer to the preceding question, the corn and minerals ration.

From five years of extensive

The Recent Rations to Supplement Pasturage

Ingredients	12 Percent Protein	14 Percent Protein	Corn and Minerals
Whole corn or wheat	60	50	F. C.*
Whole oats	10	10	
Coarsely ground corn	15	18	90
Wheat bran	5	6	
Meat scraps, 50% protein	3	5	
Soybean oil meal	4	8	
Oyster shell or limestone grit, chick-size	1	1	2
Granite grit or gravel grit, medium	1	1	2
Salt	1	1	2
Bonemeal, feeding-grade			6

*Free choice of whole corn

experiments with the free-choice feeding of whole corn and a whole oats-mash mixture (a satisfactory procedure) came a new type of growing ration — the all-in-one, whole corn-whole oats-mash mixtures in 1945 — to supplement pasturage. The first new rations were built upon two levels of protein—12 and 14 percent.

In 1945 and 1946, both the White Leghorn and Rhode Island Red pullets made as satisfactory growth with the 12 percent protein ration and Ladino clover pasturage as did the pullets which received the 14 percent protein ration. It was thus indicated that 14 percent protein was more than necessary to supplement Ladino clover pasturage. Consequently, the 14 percent protein ration was omitted from the pullet growth experiments in 1947 and the 12 percent protein ration was selected as the standard control ration with which the corn and minerals rations was compared. It is noteworthy that the use of the 12 percent protein ration, in itself, meant a saving of 54 percent of the protein meals previously used in the 14 percent protein ration.

Most surprising was the corn and minerals ration which yielded as satisfactory growth of White Leghorn and Rhode Island Red pullets on Ladino clover pasturage in 1946 as did either the 12 or 14 percent protein rations. In fact, the Rhode Island Red pullets which received the corn and minerals ration started to lay the same day as did the pullets which received the 14 percent protein ration, and weighed .21 pound more per bird when taken from range.

Again, as last year, the Rhode Island Red pullets which received the corn and minerals ration and Ladino clover pasturage from May 8 to June 19 weighed .12 pound more per bird than did the pullets which received the 12 percent protein ration. A primary consideration in this year's range experiments is to compare the value of the corn and minerals ration as a supplement to ordinary grass pasturage, such as found on most Ohio farms, with that of Ladino clover pasturage.

Is there any advantage of frequent removal and renewal of the floor litter in the brooder house over the use of built-up litter for much longer periods? Thus far, no disadvantages have attended the Station's use of built-up litter and hydrated lime in the brooder house for more than a year and used almost continuously for four different succeeding broods of chickens. Most surprising was the fact that no trouble has been experienced from coccidiosis during the brooding period since the longer use of built-up litter and hydrated lime procedure has been practiced.

That the fourth brood of chicks on floor litter started in May, 1946, and not removed for over a year fared as well as those on new built-up litter started in May, 1947, was contrary to accepted practices. The percentage loss of chicks during the 8-weeks brooding period was low (averaged 7 percent) in all of the groups. There was no indication of coccidiosis or ill effects from the use of built-up litter (without removal) for one brood of chicks after another.

Most remarkable of all, however, were the results of the experiment in which the chicks were brooded and raised in the laying house on built-up floor litter, treated with hydrated lime and previously used nearly 2 years by hens, with only a 2-week interval between removal of the hens and the starting of the chicks. That these chicks also fared as well as any of the other groups which were started on fresh, built-up litter was indeed a surprise.

No definite explanation for these surprising results can be given at this time. These built-up litter procedures are in line with the old contention that dry litter is one of the best preventives of coccidiosis. The built-up litter with frequent stirring is, in itself, a dry litter procedure. The hydrated lime is an additional aid in keeping the floor litter dry. There are, however, the two big unknown factors not yet accounted for: the chemical and bacterial processes involved in the built-up litter and its treatment with hydrated lime. These may in time prove to be the factors responsible.

How long may built-up floor litter for layers be safely used without removal? Since the fall of 1946, nine pens of Leghorns and six pens of Rhode Island Red pullet layers (a total of 775) have been on last year's built-up floor litter started in October, 1945.

Thus far, September, 1947, it appears that the built-up litter in the laying house may serve as well or better during the second year as during the first. No advantage was realized from the removal and renewal of the floor litter in four of the pens (200 layers) each 2 weeks. This was a costly procedure in labor and required the use of 14 bales of shavings during 28 weeks, in each pen of 50 layers, as compared with 2 bales of shavings used in each of the built-up litter pens. Fifty pounds of hydrated lime were used in each of the eight built-up litter pens. No lime was used in the fresh litter pens which were changed each 2 weeks.

These and numerous other timely questions of importance to poultrymen are being dealt with by the Station's research work with poultry.

Sudan Grass for Late Summer Hog Pasture

Condensed from American Hampshire Herdsman

C. M. Vestal

THERE is a need in most hog pasture programs for a spring or early-summer sown crop which will furnish good pasture during the hot, dry months of late summer and early fall. This kind of crop serves either as a supplementary or substitute pasture on farms where seeding failures, winter killing, dry weather and other causes of shortages in the regular rotation pastures occur. This kind of pasture is especially valuable on farms where the rotation pasture crops are not regularly available for hogs.

Sudan grass has growth qualities which make it suitable as a supplementary or substitute pasture for use in late summer and early fall, when pasture shortages so often occur.

During the summer of 1947, Sudan grass was used in a comparative pasture test. The Sudan grass seed was sown in June, and in July an experiment was begun in which Sudan grass and alfalfa were compared as hog pasture.

Plan of Feeding

Three lots of pigs were started on feed July 17 and fed until September 11, a period of eight weeks. Each lot contained 18 pigs with an average starting weight of 75 lbs. All pigs had a free choice of shelled corn, protein supplement, mineral mixture and loose salt. The protein supplement was equal parts of soybean oil meal and meat and bone scraps. The mineral mixture contained limestone, steamed bone meal and salt. Lot 1 was fed on alfalfa pasture, and Lot 2 on Sudan grass pasture. Lot 3 was fed dry lot.

Alfalfa pasture increased the gain of the hogs 8.7 per cent over those fed on dry lot. The increase with Sudan grass was 2.1 per cent. Compared with dry lot feeding, alfalfa pasture saved 6.4 per cent of the corn and 22.3 per cent of the protein supplement. Sudan grass saved 2.7 per cent of the corn and 18.1 per cent of the protein supplement. A minor saving of salt and other minerals was the same for the two pastures.

On the basis of relative feed cost of gain in the dry lot and pasture feeding, alfalfa saved 2.5 cents a hog daily, and the Sudan grass, 1.4 cents.

With the pasture value of 2.5 cents a hog a day, an acre of good

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alfalfa, which will graze 20 full-fed hogs with a protein supplement, would be worth $15.00 a month. Sudan grass would have to graze 36 similar hogs an acre to be worth $15.00 a month, on the basis of its saving in the feed cost of gain in this experiment.

The carrying capacity of the Sudan grass was not determined because of the excess of growth in the lot. It was necessary to clip the crop twice during the experimental period. Observation of the experimental hogs, and others, grazing Sudan grass indicated a very heavy carrying capacity for this crop.

RESULTS

Lot	Average final wt. of hogs	Average daily gain	Feed for 100 lbs. gain		Feed cost of 100 lbs. gain not incl. pasture
	lbs.	lbs.		lbs.	
1. Alfalfa pasture	171	1.72	corn	295.2	$14.06
			sup.	37.9	
			min.	.5	
			Total	334.6	
2. Sudan grass pasture	166	1.62	corn	306.9	$14.65
			sup.	40.0	
			salt	1.0	
			min.	.5	
			salt	1.0	
			Total	348.4	
3. Dry lot	164	1.58	corn	315.4	$15.52
			sup.	48.8	
			min.	.7	
			salt	1.5	
			Total	366.4	

Prices of feeds—Shelled corn, $2.24 a bu.; soybean oil meal, $100.00 a ton; meat and bone scraps, $135.00 a ton; mineral mixture, 3c a lb.; and salt, 1.1c.

Fruitwood is Famous for its Quality

Condensed from American Fruit Grower

THERE many old fruit trees which, although most of their productive years of fruitfulness are past, are not spent yet. When fruit trees age, the grain of their wood becomes finer, and takes on tints that cabinet makers and workers of fine woods are constantly seeking.

Today, fruitwoods are not used as extensively as in the past chiefly because they do not lend themselves to the mass production methods of modern furniture factories. This is because the trees have short, gnarled trunks, and sawing them is more difficult and expensive than sawing taller, straighter trees. However, the fruitwoods are still used for custom-made furniture and many small items ranging from potato mashers and gavels to picture frames and bedsteads. The J. H. Monteath Co., of New York City, is one of the largest fruitwood buyers.

Pearwood

Pearwood is perhaps the most famous and most frequently used of the cultivated fruitwoods, since its firmness, harness, toughness, and fine, close grain make it durable and easy to carve without breaking. Its durability makes it an excellent wood for printing blocks, drawing squares and triangles, and the wood is fine for lathe turning. It works easily and takes a high polish.

The usually uniform structure and straight alignment of pearwood fibers makes this one of the finest woods for carving, since it can be worked in any direction. Wood carvers also like it because its toughness permits deep undercutting—such as a curled leaf or flower tendril which might be barely attached to the base part of the work. This quality is useful in the making of rococco mirror frames, picture frames, and some furniture carving. The wood is particularly desirable for carving figures of the human form, since it is naturally a flesh color. It is also used in the recreation of certain French "period" furniture, a craze for which was begun when the old French ocean liner Isle de France first arrived in America with her beautiful pearwood furniture. However, most of the pear veneer used today for this purpose is imported from France, where the pear trees grow older and larger than American trees. Today most

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of the pearwood used in furniture masquerades as ebony, since it closely resembles that wood when dyed a rich black. Both pear and apple woods are used for inlay and marquetry, and are often found in the department and furniture stores in that form.

Applewood

Applewood is still used in modern work, and like the pear, is very hard, close-grained, and takes a good finish. It, too, is good for undercutting in carving, and is the chief wood used by the John C. Campbell Folk School of Brasstown, N. C., where it is used in wood carving classes. Ernest Kunberger, in his backyard shop in New Hampshire also makes a great many items from applewood, including napkin rings, boxes, fruit bowls, salad bowls, candle sticks, sewing stands, and knife and fork handles. The wood, which is likely to warp unless well seasoned, has been extensively used for implement and tool handles, and was once used as a cabinet wood. The heartwood is a pale red color turning into a brownish cast in the sapwood. In the finished product, applewood is often mistaken for birch which it closely resembles in appearance.

Cherry is one of the most frequently used of the fruit woods, but only the Wild cherry or Black cherry is employed, since the trees grow very tall and straight, providing good lumber. It is used for cabinet making, tool handles, novelty articles, base blocks for electrotype and printing plates, and for piano actions. Its chief value derives from its color, finishing qualities and lustre. It can be used so well to imitate mahogany that only experts can recognize it.

Other fruitwoods such as citrus and mulberry are sometimes used for small objects and souvenirs. Mallets, potato mashers, and rolling pins are sometimes made of the hard mulberry wood.

So you see, when those fruit trees are getting old, don't burn them up as firewood. Look each tree over. There may be a lot of life in the old fellow yet!

Golden Delicious and Cortland apples do not turn dark when sliced and used in salad. Other varieties should be sprinkled with lemon juice when used in salads.

Chemical Soil Poisoning Termite Control

Condensed from The Western Farm Life

SEVEN chemicals which proved reasonably efficient in the control of termites by soil-poisoning in a series of unfinished experiments at Beltsville, Maryland, are listed by the bureau of entomology and plant quarantine, United States Department of Agriculture. They are sodium arsenite, lead arsenate, sodium fluosilicate, cryolite, phenothiazine, pentachlorophenol and orthodichlorobenzine.

In preliminary announcement of results the scientists emphasize, however, that soil-poisoning is a measure supplementary to primary termite-control methods of a structural nature, which offer permanent protection.

Soil-poisoning, though beneficial, is less permanent and should be used only where structural control methods are impractical, or in addition to them. Most termite infestations are due to faulty construction and are found principally at filled porches, terraces and other entrance structures, or in basement apartments. Control consists, in the main, in blocking off termite entry with concrete or other impervious material.

Other recommended measures for discouraging termite activity include adequate drainage around and under buildings, ample ventilation under them and the removal of wood debris. Such measures apply to all construction, but particularly to basement-less dwellings which are exceptionally favorable to termite activity.

In these tests, holes are dug 15 inches in diameter and 19 inches deep, about 2 cubic feet of soil being removed. The soil is treated as it is replaced with the chemical to be tested. At least three rates of application are used, ½ pound of the poison material per cubic foot of earth being the standard. Wooden stakes are driven in the soil to find whether the material used protects them. At Beltsville, 74 different treatments involving 27 chemicals and chemical mixtures have been tried, including some chemicals and dosages that have already been recommended for termite control.

Lead arsenate, used as a dry powder, proved remarkably good during 4 years of service, whether at ¼, ½, or 1 pound per cubic foot of treated soil and, after 3 years, dry sodium arsenite, as well as the 10-per cent solution, held up remarkably well in low

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dosages. Sodium fluosilicate, cryolite and phenothiazine, used dry, all showed up well, but diphenylamine and phthalonitrile, which had appeared excellent in the laboratory, failed under these conditions. Trichlorobenzene, either alone or in combination with 5 per cent of pentachlorophenol, proved good.

Pentachlorophenol when used alone was weak in low dosages and the highest dosage tested, equivalent to 2½ gallons per 10 cubic feet, may be the minimum strength for effective protection. Orthodichlorobenzene proved erratic when applied in a dose equivalent to 1 gallon per 10 cubic feet.

DDT apparently has value when used as a 5-per cent solution in fuel oil. Further tests are necessary to obtain more complete information regarding the value of DDT as a soil poison against termites, since the use of oil alone proved satisfactory for 2 years.

Spraying Sheep with D D T

Condensed from The Dakota Farmer

Kenneth Leslie and Donald Klebsch

Meade County

Does it pay to spray sheep with DDT? Ask the owners of flocks that have been sprayed and you will get your answer. We did. We think you will be interested in some of the remarks made by the sheep producers who owned part of the 25,000 head which we helped spray.

One prominent purebred breeder remarked, "The DDT is all that it is claimed to be and more. You have to be out here with the stock before you can fully appreciate the full value of it." Another said, "I can't say enough for it. Mosquitoes and flies didn't bother the sheep as in past years. We haven't any flies around the buildings. I am a booster for DDT spraying." One producer replied, "My sheep have done better than they have ever done before. They are free of ticks and the mosquitoes and flies have not bothered. Another sheepman stated, "I have examined several dozen of my sheep since you sprayed them, and I have not found a live tick. I like spraying much better than dipping as it is so much easier on the sheep.

Our first attempt at spraying sheep was discouraging to say the least. It was new to the sheep,

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to the producer, and to us. We were all willing except the sheep. We set up the pens, connected our automatic spray boom, and were all set to finish the job in an hour. The sheep had other ideas. It took us 10 hours to spray 800 head of ewes and their lambs. We ended up much better than the sheep. The automatic boom was put aside in favor of hand spraying. It was the first and last time we used the boom. We decided it wasn't getting the sheep wet enough, and, in the process of getting the sheep through, we were getting too wet. I might add, however, that for spraying feeder lambs, wethers, or ewes alone, the automatic boom will do a fair job. If the lambs are three or four months old, it will work to a fair degree of efficiency.

Since our first attempt at sheep spraying we have cooperated with 26 sheep producers. In all cases the flocks that were sprayed were a lamb-ewe combination. The size of the flocks varied from 100 to 2,500. We used two spray brooms equipped with three No. 307 Bean spray nozzles each. The nozzles were fitted wth a strainer and we bored a ⅛-inch hole in the whirl plate so as to produce a pencil-type spray stream. Our county-owned power sprayer was operated at 600 to 650 pounds pressure. Eight pounds of 50% wettable DDT per 100 gallons of water were used.

The amount of spray used per sheep varied. The average was about three and one-half sheep per gallon. Since the bulk of our work was done in July this means that the ewes had well over a month's growth of wool, and the lambs were carrying an average of three and one-half months' growth. A big factor in the amount of spray used was the type of holding pens available.

At most of the ranches, the holding or spray pens were built the same day the sheep were sprayed. By using a few panels and steel posts a suitable spray pen can be set up in a few minutes. Where two hoses and two spray guns were available, we built a pen 50 feet long and 12 feet wide. By placing the spray machine at one end of the pen the two guns can be used, one on each side, without having to run a hose over the top of the pen, thus eliminating getting the hoses down under the sheep.

When using a pen where the side of a barn or a solid board fence could be used for one side of the spray pen, we found it best to make the pen about six feet wide and 100 feet long. Our machine was placed in the center of the panel side. The six-foot width enabled us to reach the sheep readily from the one side. On ranches where a barn or shed was available, we always built our spray leading off from the

shed. It is much easier to work sheep out of a covered enclosure, than from open holding pens. Outlet chutes were narrowed down to a 14-inch width. We used one of our three nozzle brooms as an underliner.

This question has often been asked: Do the sheep tend to pile up in the spray pen? The answer is, yes, they do. We lost two lambs out of 25,000 through suffocation. Both cases were due to our having to refill our spray tank. We now check our tank carefully before starting in on a pen. We soon found that by using our two spray guns and starting at opposite ends of the pen, we were able to prevent the sheep from piling up at one end. We held our spray guns practically on the backs of the sheep and worked as rapidly as possible. After twice over we opened the chute gate. One of us used his gun as an underliner while the other climbed into the pen to start the sheep moving and to check any that may have been missed.

According to the sheepmen we have worked with this summer, it most certainly pays to spray with DDT. Lambs going into the feedlots this fall will return more dollars and cents if you can free them from ticks. A DDT suspension of eight pounds of 50% wettable DDT to the 100 gallons of water, applied under pressure, will do the job. Particular attention should be paid to seeing that the underline of the lamb is thoroughly sprayed.

Cull Dry Ewes

Cull the ewes that remain dry their first year, and you'll increase lamb production.

That's what the sheepmen learned at the U. S. Sheep Experiment Station at Duboise, Idaho. They used Columbia ewes, now widely used on Western ranges, and in Midwest farm flocks.

Ewes which had a lamb their first year, even though they may not have raised it, averaged 14 more pounds of lamb each of the next three years than the ewes which did not lamb the first year. Ewes *raising* their first lamb averaged 16 more pounds of lamb each of the next three years.

Ewes having twins their first year, regardless of whether they raised them, averaged 19 more pounds of lamb the following three years.

So, when a ewe has a lamb and raises it the first production year, it indicates she'll be a good lamb producer. —*Farm Journal*

Turkeys — Large or Small?

Condensed from The Rural New Yorker

Donald J. Lehman

EVEN though the Beltsville Small White turkey, the government's own breed, can wear at least six candles in its birthday cake, 1947 is the first year in which the dwarf bird has come to market in sizeable numbers. Stanley J. Marsden, Beltsville turkey breeder who mingled the varieties that produced the breed, can only guess at the figure, but he is inclined to put it in the neighborhood of 1,000,000 birds. This is only a small fraction of a U. S. crop that is running close to 35 million birds. Nevertheless, it is a real achievement for the Beltsville Small White. The breed was an early casualty of the war effort when the military services demanded heavy turkeys to carry the spirit of Thanksgiving and Christmas to U. S. soldiers, sailors, and marines around the world.

This war time demand for big birds was, however, a breathing spell which the government breeding staff, under Mr. Marsden's direction, put to excellent use. For the breeders had performed all too well when they first dwarfed the turkey to fit both the families and the kitchens in modern-day apartment houses. The famed breed that was announced in 1941 not only turned out to be slightly too small, but also exhibited a dismaying hereditary trait for shrinking in size in new generations.

In 1943, the breeders mated their light birds with the giant of the turkey kingdom—the broad-breasted variety of the Bronze breed. The new birds, both toms and hens, weighed a pound more than their ancestors in the original Beltsville strain to give the turkey men a precise bull's eye. Both strains, the retreated job and the original, can be found in those being marketed this year.

The broad-breasted bird used by the scientists to add heft to their dwarf is itself a new variety that appeared in the United States from British Columbia sometime before 1939. Its liveweight ranges from 15 pounds in hens to 26 pounds in toms while out-size birds running to 30 pounds and more are common. The bronze giant flashed into immediate popularity with growers, especially under the incentive of military buying, while the lighter Beltsville bird, which averages

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nine pounds for the hen and 15 pounds for the tom in the new strain, lost favor and nearly disappeared.

The small bird's forward surge this year displays the role it can play to perfection in U. S. turkey production. The customary premium for small birds showed up in extreme form last year when it reached as much as 20 cents a pound. Lighter birds sold fast while the gigantic 30-pounders, more often than not, went into coolers and freezers for sale later to restaurants and institutions. Premiums of 20 cents are considered highly uncommon, but last year's price spur was what the Beltsville breed needed to move swiftly along the road back. Last year's crop of Small Whites ran as high as 200,000 birds, and the small-bird premium was the incentive breeders needed to hold the hens for breeding this year.

Estimates of what kind of premiums growers will collect in the future range anywhere from one to 10 cents a pound. But they will need it, for the Beltsville Small White is a somewhat more expensive bird to raise, pound for pound, than larger turkeys. The premiums ordinarily will cover the additional cost and give growers added profits. At least that is the theory that led the Department of Agriculture to breed the dwarf at the U. S. D. A. research center in Maryland.

Experimenting started in 1934 when the necessary Bronze and White Holland eggs were hatched. The first cross came the next year, and then the turkey geneticists expertly infused strains from the Black, Narragansett, and White Austrian varieties and the Eastern wild turkey. Each strain was selected to add carefully chosen characteristics to the mixture—small size, good breast muscles, fleshy legs, good feathering, and the like. When the original strain was announced in 1941, the breeding project was far ahead of schedule—by as much as four or five years.

Three other small varieties, generally considered somewhat less popular than the Beltsville Small White, have been bred. The Jersey Buff comes from the New Jersey Experiment Station, while the Royal Palm is the progeny of a sport which a private grower found in his flock at Lakeland, Florida. Both weigh a pound more than the Beltsville bird. The Nittany, an even lighter turk bred from wild stock at Penn State College, has been abandoned.

Smaller turkeys are only one answer to the problems of marketing ever larger birds. Market weights have climbed steadily since 1929 when the average turk weighed 13.2 pounds. The peak came last year at nearly 18 pounds. A rapid rise since 1940

deflected the demand for large turks and the growing popularity of the Bronze in its broad-breasted form. But this year's crop of nearly 35 million birds, enough for 4.1 pounds of turkey for everyone in the United States with what's left from last year's crop, could run off a trifle, partly because of the revived interest in small birds and partly because high feeding costs may have sent flocks to market early.

Large birds were a marketing problem for the first time in 1945 when military buying was cut back hard and fast. The marketing solutions have circled around the simple principle of cutting up the giants to get them over the retail counters. Chain stores tried their hand first with half turkeys, then turkey in quarters. Neither technique won immediate wholehearted acceptance with consumers who want to roast a bird with a pair of drumsticks and dressing inside. In addition, housewives had to learn the knack of roasting turkeys halved and quartered. Turkey in parts, somewhat similar to halving and quartering, is an adaptation of a marketing practice that has been successful in selling chickens for several years. This system can be expected to grow. Turkey steaks, now appearing in the Southwest, are a real innovation in poultry marketing. The originators of the various ways of fashioning steaks from turkeys believe this may be the answer to the marketing puzzle the larger birds have created. The simplest methods of steaking turkeys are to slice frozen birds clean through the bone either lengthwise or crosswise. The lengthwise cut was developed in Kansas, while the cross-cut steak comes from Texas. Both are in commercial use.

Texas A. & M. College is the source of the third method of converting turkey meat into steaks. Prof. F. Z. Beanblossom announced the technique early this year. The turkey is first boned and then the meat is machine-kneaded into oblong cubes weighing four ounces each. Prof. Beanblossom's steak has enjoyed increasing popularity in Texas where turkeys now run large in size in keeping with the Lone Star tradition.

What turkey steaks, in one form or another, mean to the Beltsville Small White is not wholly outside the range of prediction. The little bird has demonstrated the part he can play in turkey marketing by coming back from near extinction to meet the challenge of the big birds in-the-whole. It is equally likely that the dwarf can cope with the giants steaked on in pieces so long as Thanksgiving's tradition of stuffed birds, with crackling brown skin and drumsticks at attention, persists.

England Faces the Future

Condensed from The Michigan Farmer

Clifford M. Hardin

TODAY the average Britisher as he faces the future is a little tired, and quite conscious that he is eating a menu heavy in fish, potatoes and cabbage. His nutritional health, however, is good.

He knows that something has happened to his country economically and that luxuries will be scarce items for him for years.

He respects his government and generally obeys its laws—though he might get around to changing parties again sometime.

His clothes are getting a little shabby, and he is particularly appreciative of parcels of children's clothing from America.

England is importing one-third more than she is exporting. Consequently, she is going deeper and deeper into debt. That is her dilemma!

In order to escape it she is attempting to follow a 2-pronged program of recovery. First of all she is trying to expand industrial production so that more can be exported. That means more coal, and coal production is lagging. An effort is being made to modernize the mines and factories, but that program at best will be slow.

The second part of the program involves increasing the production of food so that they won't have to buy so much from abroad. Precious dollars can then be used for other purposes. By increasing industrial exports on the one hand and importing less food on the other they hope eventually to close the gap between imports and exports.

Before the war England loafed along with 6 per cent of the population engaged in food production—and produced about a third of her own food needs. At that time thousands of acres of English land were virtually abandoned—some of it had been for generations. Much of the landscape was and still is, carved up into small fields and lots by hedge rows, stone and earth fences, and game belts.

Many landowners had little apparent interest in their holdings except as it provided them with a place to hunt or shoot. Under the pressure of war the government has forced much of their abandoned land back into culti-

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vation—some of it for the first time in more than a century.

English agriculture is still in the process of changing. Mechanization has taken place in some areas—particularly on the larger farms—but in most parts of England, the methods of 50 years ago are still used. The typical English farm is still a small unit of perhaps 40 to 60 acres which is operated with the aid of only a small amount of power machinery.

Mechanization has progressed far enough to show what it can do. The second day that we were in England we visited a farm operated by a Mr. Patterson who lives about 40 miles west of London. Mr. Patterson, a self-styled tenant farmer, operates about 7300 acres, none of which is owned by him. The land is rented from about 30 different landlords. Agreements by which the land is held are generally on a yearly basis. In one case a farm of 850 acres had no owner who could be found and possession was taken by occupation. Much of the land was unfarmed prior to being taken over during the war. Rents are all paid in cash and vary from $1.20 per acre on land previously considered worthless to $5 on better land. Land prices varied from $25 to $50 per acre in 1939, but today range from $80 to $200.

Mr. Patterson has divided his operations into 6 units, varying in acreage from 700 to 1800 acres —each in charge of a hired manager or foreman. He keeps around 1200 dairy cows and sells considerable quantities of food grains. He also raises some potatoes because he is required to do so by the government.

The dairy cows are divided into herds of 75 each and each separate herd is in charge of a "herdcowman" who has one assistant—a man, woman or boy. The herdcowman works 6 days per week for which he receives a wage of about $20. He would normally produce 1000 to 1200 pounds of milk per day.

I don't believe that I have ever seen a farm in the United States that was operated with greater apparent efficiency than this one. The milking operation is performed in "bails" or milking parlors" which are built to handle 4 to 8 cows at a time. The cows are milked by machine and fed while being milked. They are never housed and generally, Mr. Patterson says, do best in frosty weather. Zero weather is sometimes experienced.

Haymaking has been abandoned, but grass is stored as silage in "pits" or trench silos. When silage is being made, the following equipment and manpower is used: 1 tractor with mower, 1 tractor for packing grass in pit, 2 four-wheel drive

trucks (army surplus) with "buck-rakes" and 2 men in the pit. Such a team will normally make 80 tons of silage in one day. Grain is harvested with 12-foot self-propelled combines which were imported from the United States. The Patterson operation is an unusual one in England, but it is undoubtedly pointing the way for other farmers who will eventually follow in Mr. Patterson's footsteps—though on a smaller scale.

Mechanization comes slowly. Small fields, narrow gates, and stone or brick barns already centuries old, are not readily adaptable. In southern England we saw one field of 23 acres that until a short time ago had been divided into 17 separate lots by stone and earthen fences. These fences were removed only at considerable expense.

The British Parliament recently passed a new long term agricultural act which is designed to increase food production to 150 per cent of its pre-war level and to provide security for farmers. Under the act prices of cereal grains are announced 18 months in advance; prices of livestock are set definitely for 2 years in advance and minimum prices are provided for an additional 2 years. So far no price guarantees have been provided for horticultural products.

A county advisory system has been developed to help make the new program work. The county advisor performs services which in the United States might be performed by the county agent, the AAA chairman, and the local Farm Bureau unit. In addition to this he serves as "secretary" for the county agricultural councils.

The county councils may determine crops to be grown and allocate feeds to farmers. Inefficient farmers can be dispossessed by the county committee—whether they are owners or renters. A renter who feels that his landlord is charging too much rent may appeal to the county council. If this body agrees, the landlord may be directed to lower the rent. If the tenant wishes to have certain more or less permanent improvements made which the landlord is unwilling to finance, he may appeal to the council. If the council agrees that the improvements are desirable, it may authorize the tenant to have them made. If the tenant should leave the farm, the landlord must provide full compensation for unused improvements.

Government officials argue that if they are to guarantee prices and income to the farmers, the government has a right to expect performance. That is why they insist on dispossessing inefficient farmers.

The country assembly of milk

has been "rationalized" to the point where only one truck passes each farm. The farmer, therefore, has one market for his milk. The price is established by government decree. So is the hauling rate, the distribution margin, and the price to the consumer. Retail milk delivery service is still being maintained, but there is only one delivery wagon per street.

This brief description of some of the control measures has been given to illustrate in a small way the extent to which the British economy is now controlled.

British consumers may buy all they want of potatoes, fish and vegetables, but most other items are subject to strict rationing. A week's ration for one person looks about as follows:

Two ounces of tea; 2 ounces of cheese; 10 ounces of sugar; 2 ounces of butter; 4 ounces of margerine; 2 ounces of bacon; 1 ounce of lard; 2 ounces of corned-beef; ½ pound of steak or 2 chops, the total cost not to exceed 20 cents; 9 bread units (3 pounds of flour equals 9 units); 2 pints of milk if available); 1 egg every 10 days; plus 7 points (but one can of fruit is 20 points, and canned milk is 7 points). Children and workmen performing heavy work get special allowances of additional food. Babies get milk and cod-liver oil.

The food rationing program appears to be fairly successful from the standpoint of providing everyone with a fair diet, but it works a tremendous shopping burden on the British housewife who must spend hours each day on shopping expeditions.

The following table shows in percentages how the consumption of individual food items compares with pre-war:

Items	Calendar Year 1940	Year Ending June 1947
Dairy Produce (excluding Butter)	100	139
Meat	90	85
Fish and Poultry	69	109
Eggs	92	86
Oils and Fats	92	74
Sugar and Syrup	71	74
Potatoes	98	166
Tomatoes and Citrus	69	84
Other Fruit	80	82
Leafy Vegetables	104	107
Other Vegetables	68	109
Grain Products	108	110
Beverages	106	110

Milk consumption per person is up 30 per cent, yet the average adult is allowed only 2 pints per week. This can only mean that milk consumption was extremely low before the war. With full employment many more people can afford to drink milk. The meat ration looks small, yet it is only 15 per cent below pre-war—and for the same reasons. Fats and sugars are the most severe shortages. The item that has changed most in the British diet is potatoes—up 66 per cent.

I believe that the worst thing about the British diet is its monotony. After a few days you become very conscious of potatoes,

cabbage, and fish. The potatoes are always mashed and the cabbage is always boiled. When we left England on October 1st, the people were looking forward to the Brussels sprout season—and a change from cabbage! Although some of the people complained of being tired—the food is filling and generally satisfying.

What Makes Machinery Wear Out?

Condensed from Successful Farming

Jim Roe

VERY few farm machines ever actually *wear* out. Rust or breakage is what usually sends them to the scrap heap—and you to the bank for money to buy new ones.

Think back. How long did it take you to get the cornpicker working right when you began picking this fall? Chances are it took a tune-up job before you went to the field, and more adjustments every now and then all during the first day of picking. That was your old friend, rust. As it ground itself out of bearings and off the chains, you had to adjust the machine to take up the slack.

Maybe a spot or two wouldn't work itself out. Perhaps it froze a bearing, or stiffened a chain. Then, if the slip-clutch didn't work just right, you had a few new parts to buy.

Rust is easy to get—but it's mighty expensive. A good many agricultural engineers in our experiment stations and colleges believe it is the No. 1 killer of farm machinery. Very complete tests back up their opinion.

Cornell's B. A. Jennings, for instance, put in a good many hours of work finding out what happened to machinery on farms in the state of New York. He found out how many years, on the average, each of 26 different tools lasted. He found out the average yearly use of each one, and figured just how many 10-hour days of work each machine would do, from the time it was new until it had to be discarded.

He found that a side delivery rake could be expected to last for 16 years, but that it would only do about 40 days of work during that whole time. A spring-tooth harrow, while it would only last, on the average, for 11 years, would put in 134 hard days of work before giving up. The average corn planter lasted 19 years, in which it did 57 days of work.

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Tractor-drawn discs were good for 13 years, of which 91 days were spent in the field. A horse-drawn sulky plow took first prize for number of days' work it would do, promising 180 days, over a period of 20 years.

Booby prize went to a hay tedder, which would do only 16 days of work, though it would space those days over 25 years.

Those are *averages*. The most significant thing about an average is that no specific machine ever acts just that way. This is shown in Iowa tests, where the average life of grain binders was found to be 24 years. But *individual* binders had lasted only 5 years, while others had gone perking merrily along for as many as 47! Which yearly overhead would you rather stand?

What makes the difference? That's what the experts tried to pin down. They tried to match length of life up against difficulty of the job. That didn't work—a potato duster has a relatively easy job, yet would promise a lifetime of only 32 days. A hard-working field cultivator, on the other hand, would do 150 days.

How about housing? Well, binders or grain drills usually get good care. They aren't used during wet weather, and if anything is put inside for the winter, they are. Yet neither binder nor drill will last for as many days as will some harder-working field tools that are more commonly left out in the weather all year long.

As Mr. Jennings tried to match up these figures, and find *why* some machines lasted longer than others, only one other item seemed to correlate at all with length of life. This was the number of hours *per year* that each machine was used. As the yearly use increased, so did the life expectancy in terms of days a machine would work in its lifetime.

"It almost seems as though the more you use a machine, the longer it will last," Mr. Jennings reports. "There is no correlation between length of life and type of use, or care. But there's a direct correlation to hours of use each year. On the basis of these tests, I have decided that, when you get the machine polished up and ready to go, you're all set. The wear is not in the *running* of the machine. It's in the breaking loose and polishing up.

"Rust makes the difference. That's proved by the way you don't get a complicated machine working right for the first half day. And the more complicated the machine becomes, the more that holds true. The answer? Use each machine as much as possible, and use rust-proof compounds during off seasons.

"My personal opinion, too, is that we can get more money's worth from lightly built machines, with less first cost. Then

we can take good care of them, and make them last for a long time. A heavy, strongly built machine doesn't do you any good if you grind its wearing parts to pieces with rust."

That idea is backed up by Iowa figures, which also show that most of the year, your machinery investment is sitting idle. The average annual days of service obtained from each machine is surprisingly low. Not counting the tractor and truck, Iowa farm machines, on the average, are used only 11 days out of each 365. The less money you can have tied up in machinery which stands idle 354 days a year, the better. And the less rusting there is going on during that time, the longer it will be before you have to lay down money for a new machine.

After a winter of rusting, the first half-hour's operation of your picker or combine is apt to do far more harm to the machine than the rest of the season's work. Unless you enjoy welding broken castings, or like to run into town and buy new parts—or whole new machines—your best bet is to make your present machines last longer.

That's not too tough a task, once you decide to do it. The care you use in putting your picker and combine away for the winter can make the difference between a smoothly running machine next season, and one which has you exercising an end wrench all season.

First, never put a machine away without fixing or carefully noting broken, worn, or bent parts. You became so painfully familiar with them during the combining or picking season that you think you'll never forget them. But you will, only to find them again next year.

So take a little time and go over the machine. If you can, tighten up all loose parts, replace the worn or broken ones while their locations are still fresh in your mind. If you figure you're in too much of a hurry now, tie a red rag on each part that needs attention, so you can find it easily this winter when you can repair it at a little more leisure.

If new parts are needed, write the part number down and leave the order with your dealer *now*. Then when a burst of energy hits you in the winter, and you decide to do a little machinery repairing, you'll have everything you need for the job while you're in the mood.

Even if you can't find time actually to repair the machine back to tiptop shape, you'd better take the time to clean it up thoroughly. A month or two from now will be too late for that job. By that time, the mud, stalks, kernels of corn, and grains of wheat, and beans will be solidly

frozen in the corners in which they have become lodged. And underneath them, the metal will be rusting rapidly.

Take a wire brush, a screwdriver to reach in the right places, and the garden hose or the air hose from your compressor, and go at it. It won't take long to loosen and brush, wash, or blow the dirt away.

Take off the canvases, and store them somewhere where they won't serve as mouse apartments. Remove V-belts from one pulley, or loosen the tension on them.

Now you're ready to do the most important job af all: apply rustproofing compound to *all* unpainted surfaces. Rust costs money, and this is the way to stop it.

If you're interested in chemistry, you know rust is formed as the result of a chemical reaction —iron combining with the oxygen in the air, to form iron oxide. To a chemist, that's very interesting. But to a farmer, that bit of knowledge isn't so popular—it rates right along with the discovery that mice and rats like corn. Iron oxide isn't much good as a farm laborer—it won't plow, pick corn, or combine wheat.

The thing to do, of course, is prevent oxygen from reaching unprotected iron. A good coat of paint does this, but it is impractical to repaint every year, and a thick paint film would be in the way in a lot of places in our present day, complicated farm machines. The new, petroleum-base rustproofing compounds are the answer. They form a thin, airtight coating over the metal, and will wear away quickly when the machine is put into use. Yet they halt all rusting for up to a year and longer, even in outside winter weather.

You can buy them in several forms and thicknesses, but it's best, Mr. Jennings believes, to buy in a form which has about the same consistency as molasses. This will pour out of the can, and you can thin it down with kerosene to whatever thickness you want.

It's a good idea to fill your grease guns with the compound, and give a shot to each bearing to protect it until next season. Then you can cover the rest of the machine with a swab, paintbrush, or compressed-air sprayer.

The important thing is to do a complete job. Get the rustproofer into all the corners, and underneath all the chains. Put some in an oil can, and station the hired man at the power takeoff shaft with a big monkey wrench. Have him turn the machine over slowly, so you can squirt the compound on the chains as they move slowly around. This will make sure the material works into the chain joints.

Just a note of caution. Make sure it's the hired man who is turning the power shaft. If you get your finger caught, he'll stop turning at your first shout. But a tractor doesn't hear very well, and you'll likely need all your fingers next year.

Now, after you've repaired, cleaned, and rust-proofed it, your machine is ready to go to bed for the winter. Put it in a nice machine shed, if you have one. Though no tests have ever been able to show housing made machinery last any longer, the sun and the wind will have a little less chance at the tool if it is under cover.

But make sure it doesn't just serve as a chicken roost all winter. And don't put it where a playful 1,200-pound steer can nudge it every time his back itches. Unless you have a good machine shed or clear barn floor, it will probably be better off outside. In any event, block up the wheels to save tires, and leave it in as protected a spot as possible.

We'll have to admit it will take a little time to do a good job of putting your machinery to bed. But good care can double the life of every machine on your farm.

Saving Grain on the Farm

Condensed from Marketing Activities

FARMERS can make a great contribution to the food conservation program now being carried on in this country. They can make this contribution through the more efficient feeding of grain—the food most urgently needed for the relief of hunger abroad.

Approximately 71 per cent of the total output of grain in the United States during the prewar years 1937-41 was fed to livestock. About 68 per cent of our total grain supply in 1946-47 was fed, including 187 million bushels of wheat and 5 million bushels of rye. What the percentage will be in 1947-48 will depend upon the individual feeding practices followed by millions of farmers throughout the Nation.

The more efficient feeding of grain will make an increased volume of vitally needed food available for export, of course. That is the prime objective of the conservation program. But farmers have additional reasons — economic reasons—for using their

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grain supplies wisely. The efficient use of high-priced feed will mean lower costs and important savings.

Feed supplies are short this year—not seriously short, but shorter than in some other recent years. Though slightly larger than the 1937-41 average, the total supply of concentrates for 1947-48 is smaller than for any of the years since 1941. In terms of supply per animal unit, there are 1.03 tons for 1947-48, which equals the 1937-41 average but is smaller than in any recent year with the exception of 1943. Two facts—one, the fact that supplies per animal unit are equal to the prewar average, and the other, the improved roughage situation—provide farmers with a favorable basis for saving grain.

Here is the situation. Regardless of the conservation program, farmers generally will not be able to feed grain and other concentrates to their livestock at as high a rate as in 1946-47. Farmers in feed-deficit areas may have to cut the feeding rate sharply.

The bright spot in the feed picture this year is the large hay supply. Hay supplies for 1947-48 are estimated at 118,000,000 tons, as compared with 121,000,000 tons in 1946-47, and the 1937-41 average of 103,000,000 tons. Taking into consideration the prospective reduction in hay-consuming livestock, the supply per hay-consuming animal is expected to be the largest on record.

Here are some ways farmers can save grain:

Hogs

Feed hogs out to lighter weights. For every reduction of 1 pound in the average weight of all hogs marketed, 7 million bushels of high-priced grain would be saved. If the average weight of all hogs marketed during the year ahead could be held to 248 pounds—or 10 pounds below the near-record average of 1946-47—the saving in grain would be 70 million bushels. If marketing weights could be held to an average of 237 pounds, the average for 1937-41, the saving in grain would be about 140 million bushels.

Feed a balanced ration. Hogs need from 10 to 18 per cent protein in their ration. Growing pigs need a larger percentage; heavier hogs need a smaller percentage. This protein may be supplied by such feeds as tankage, oilseed meals, and to some extent by legume hay and alfalfa meal. Minerals should not be neglected, either.

Plan now to seed rape this spring. Reserve a good legume or bluegrass pasture for hogs next summer.

Avoid death losses. Protect hogs against parasites and disease.

Beef Cattle

Feed fewer beef cattle to a slaughter grade that will average above the Good grade. A Choice yearling feeder steer usually requires between 40 and 45 bushels of corn to produce a Choice grade carcass with a weight gain of 250 to 300 pounds. It is estimated, on the basis of studies made by the Bureau of Agricultural Economics in 1945, that 60,000,000 bushels of corn or its equivalent in other grains, plus 85,000 tons of byproduct feeds, are used in the Corn Belt annually to fatten cattle beyond the average of the Good slaughter grade. During a season like the present one, when grass has been unusually plentiful, a larger than normal proportion of the cattle sold in the fall out of range areas can be marketed in good slaughter flesh with little or no grain feeding.

Feed more hay and other roughage. This can be substituted to some extent for concentrates in the feeding of cattle for market, particularly for larger animals. In this way, an increased number of cattle can be fattened and a larger quantity of beef for consumers obtained from a given quantity of concentrates.

Make maximum use of pastures. Keep cattle on grass pasture or stalk fields as long as possible in the fall, and put them on pasture as early as possible next spring. The feed that beef animals get from the pasture means just that much less grain to feed. But don't let cattle overgraze the pastures, particularly early in the spring. Let the grass get about 4 inches high before the cattle are turned out. After the grass is well grazed, move the cattle to another pasture.

Feed as little grain as possible for maintenance this winter. When cattle and calves are being carried through the winter to be placed on grass again in the spring, they require practically no grain for maintenance if plenty of good quality hay, silage, or other roughage is fed, along with the necessary high-protein concentrates.

Carry some cattle on a maintenance of roughage for a few months before starting grain feeding. One of the reasons for feeding grain to cattle is to make a substantial number of cattle available for slaughter in the spring and summer—a time when few cattle are being sold off pastures and ranges. If cattle are to be fed grain for a shorter period of time than usual, it is important for more cattle to be started on grain feed at a late date, say in early spring.

Dairy Cattle

Feed roughages to the limit. Good-quality hay and other roughages can be fed heavily without serious effects on total milk production. This is an economical and efficient practice, and

it will result in some saving in grain. Go heavy on legume hays, such as alfalfa and clover.

Reduce the amount of grain fed to dry cows. Make maximum use of roughage in feeding dry cows. Reduce grain feeding sharply during the dry period if the cow is in good condition and the hay available is a legume of good quality.

Make maximum use of pastures. Keep cattle on grass pasture or stalk fields as long as possible this fall and put them on pasture as early as possible next spring.

Poultry

Reduce the size of laying flocks through culling. Although the poultry industry has reduced production substantially from the wartime peak, further readjustment can be made and yet provide an abundance of poultry and poultry products.

Use more green feeds. This conserves grain. For example, place alfalfa hay in a rack in the poultry house and put the birds on range whenever possible. Good range will save a lot of grain next summer.

Keep flocks healthy. Only healthy chickens make good use of grain.

Reduce the mortality rate. This can be accomplished through buying quality chicks and poults. Poultry mortality has been averaging about 17 per cent. Each bird lost represents less poultry meat and eggs for consumer use as well as some loss of feed. Reducing the mortality rate also requires the adoption of better sanitation practices, the exercise of greater care in raising chicks and poults, the use of vaccines for communicable diseases, and the purchase of disease-free chicks.

Feed economically. Don't overfill hoppers. More frequent filling will avoid waste and pay dividends.

Maintain quality of the product. When eggs deteriorate in quality because they are not collected frequently or are not properly stored, packed, or transported, fewer edible eggs will reach consumers. All the feed used in the production of the lost eggs is also lost.

It has been said Nature takes 400 years to make an inch of soil —man takes an instant to destroy it.

—Pacific Rural Press

New Type Sawdust Concrete

Condensed from Pacific Rural Press

SAWDUST concrete has had considerable publicity in the past. It is lighter, warmer, more resilient, and can be cheaper because there is not much weight to handle.

At the University of Idaho, Walter R. Friberg, associate agricultural engineer, has been experimenting with a new type of sawdust concrete to which diatomaceous earth has been added, and in some cases a bit of clay. It has remarkable insulating qualities, 2½ inches of the concrete equaling about one inch of cork, or about 30 inches of ordinary concrete. The diatomaceous earth adds to its lightness, because a cubic foot weighs only about 15 pounds, compared with 62½ pounds of water, 150 pounds of ordinary concrete and 750 pounds of iron.

It is naturally not as strong as ordinary concrete, and in a wet climate it can absorb a lot of moisture. Friberg recommends that for floors a thin wearing surface of regular concrete be put on as a finish layer.

Friberg became interested in diatomaceous earth because of its use in reclamation work in California. There are important deposits of this earth in California and Oregon, and it has many commercial uses. It is a deposit of the minute shell which encloses the living cell of a form of life which swarms in water.

Friberg is building himself a house in which the floor, roof and insulation of the walls will be of the new form of sawdust cement. He had to drive 150 miles to get the diatomaceous earth. He is also using some clay. It is estimated that this form of concrete is relatively cheap in cost, despite the distance he hauled the diatomaceous earth.

Here is the mix Friberg is using:

Six and a half parts of shavings and sawdust; ½ to 1 part clay; 1 part of diatomite; 1 part of cement, all measured by volume. Sufficient water is added to make the proper mix.

He mixes the clay and water; next puts the diatomite in the concrete mixer; adds the cement; and finally the sawdust and shavings.

This mixture trowels well, dries rather rapidly, and Friberg has cast slabs as thin as one inch, which can be drilled with holes and nailed on roofs, or as insulation in walls.

Friberg in building his own

Reprinted by permission from The Pacific Rural Press, San Francisco, Calif., November 8, 1947

house will make a rather flat roof of the sawdust concrete, and floors, and the walls will consist of a coarse brick, with blocks of sawdust concrete laid on the inside. The plaster can be troweled on the sawdust concrete blocks to finish the interior.

Any sawdust used in this manner should not be green, but it does not make so much difference about shavings which may be added. Without the diatomite and clay the concrete can burn. The diatomite is not inflammable, and the clay is used principally to make the concrete less porous to water. Clay also helps make a smooth mixture.

There should be more experimenting before this form of concrete is adopted for wide use, but it sounds like a good bet for those near the ingredients who will remember its limitations in planning its use.

New Barns Out of Old

Condensed from Holstein-Friesian World

Fred J. Kreutzer

Architectural Department, James Mfg. Co., Fort Atkinson, Wis.

EVERY dairyman wants a workshop in which he can produce the most milk and butterfat with the least possible outlay for feed and labor. He is anxious also to conserve the health and vitality of his producing herd.

He needs, in these days of labor scarcity, more than ever before, a barn that is well arranged and which will enable him to reduce the time required to do the chores.

Damp, uninsulated, cold, poorly lighted and badly equipped stables are feed and milk robbers, as dairymen know.

There aren't going to be enough materials and skilled labor to build the thousands of new barns now required in the United States.

However, on our more than six million American farms there are hundreds of thousands of barns, poultry, and hog houses which have tremendous possibilities for economical remodeling and conversion into practical, up-to-date livestock housing units.

Many a dairyman has been dreaming of the day when he could have a new, well equipped barn when he actually has 50 or 60 per cent of such a structure standing in his farmstead group.

There are potentials, some visible, others hidden, in many substantially framed barns. The

Reprinted by permission from Holstein-Friesian World, Lacona, N.Y., Nov. 15, 1947

point is to bring them to the light.

Drawing on his own experience, as well as that of the barn equipment industry, a farmer can appraise the salvage value of his old buildings and quickly determine what may be required to renovate and restore them.

There is no lack of information as to the fundamentals of good stable planning. Given a good barn foundation and framework, it is a relatively easy matter to repair siding and roofing. Insulation can be added to stable walls and ceilings to conserve heat and feed. The placement of new windows and a concrete floor are relatively inexpensive operations.

Comfortable, easy-to-keep-clean stalls and stanchions cost surprisingly little. Watercups, which have again and again demonstrated their ability to increase milk flow, can be installed at moderate cost.

A litter carrier and feed truck will cut down on chore labor and thus allow more time in the fields.

A simple ventilating system to safeguard the health of the herd can readily be added to any existing building.

If a new roofing job is indicated, a builder will advise the farmer honestly and intelligently as to the most economical type available.

A vintage stable, before renovation, with its few windows, antiquated plan layout, and lack of basic sanitary planning may be hopelessly inadequate to present needs. The new plan, in contrast, may provide an almost ideal working arrangement.

It is indeed surprising what sound layout ideas will do to produce remodeling miracles in the numerous old farm buildings in every community.

Farmers, generally speaking, are too close to their every-day problems to discover the real possibilities that exist in their old barns.

The dairyman who continues to operate under the handicaps prevailing in so many old style stables simply cannot compete with his better equipped neighbor. Not only that, but it is the height of folly to let old structures deteriorate to the point where salvage is impossible.

The wise farmer will recognize the possibilities for satisfactory renovation not only of dairy barns, but will look closely at every building in the farmstead group with a view to restoration and improvement.

An over-all plan, looking toward long range remodeling of all buildings in need of such treatment, will help chart the course.

A little done each year over a five-year period will accomplish surprising results and the cost thus can come from income.

He Flips a Switch—and the Silage Comes Tumbling Down

Condensed from The Ohio Farmer

E. W. McMunn

"If I could turn a switch and have the silage come tumbling down!" Did you ever voice such a wish when you were in a hurry to finish the chores—or when the temperature outside was near zero and it seemed even colder as you crawled up the silo chute?

Throwing down the silage has always been a hand chore. It was like getting the hay out of the mow or some of the other jobs that there just didn't seem any way to do by machine. But even this job of throwing down the silage can now be done by machine.

In southern Ashland County, Ohio, Rex Long has a new machine known as a silo unloader that picks up the silage and blows it down the chute into a waiting cart. All of this by a simple turn of the switch and without going up into the silo every day. In fact, this farmer reports that he now goes into the silo about once for every door of silage that is fed out.

The new machine was bought last year and thus he has had enough time to find out how well it operates. And Long is enthusiastic with the results. He points out that this chore of throwing down the silage is something that must be done every day. During a winter many tons of silage must be handled. The machine now takes care of this work and does it while he is taking care of other work around the barn.

He keeps from 15 to 20 cows in milk, but doesn't expect the herd to grow larger than this because it would require too much time in competition with his other farm work.

The cows are housed in a pen-type barn and are milked and fed their grain in stanchions. With an ample supply of bedding it is only necessary to clean the barn twice a year. A power manure loader is used for barn cleaning.

In describing the operation of the silo unloader, Long points out that it not only saves labor, but it saves silage as well. The silo on this farm is 14 by 33 feet in size with a pit about four feet deep. This 14-foot size is almost too large for the size of the dairy

Reprinted by permission from The Ohio Farmer, Cleveland, Ohio, Nov. 15, 1947

herd when the weather is warm. It is difficult to feed the silage fast enough to keep it from spoiling.

Because of the fact that the new machine takes a thin layer from the entire exposed surface at every feeding, it has cut out this spoilage. It seems that a very thin layer removed every day is much better in keeping ahead of mold than a thicker layer, such as is removed by a fork, and taken off at less frequent intervals.

The machine for removing the silage is assembled inside the silo and is supported by three pulleys fastened to the top of the silo. Cables permit raising and lowering the machine as the silo is filled or emptied.

A three-horsepower electric motor powers the outfit. Three heavy timbers extending from the machinery at the center of the silo keep the machine centered as it is raised or lowered by the cables. From the machinery at the center extends a revolving sweep to which are attached a series of curved knives. This sweep turns when the machine is in operation and the knives scrape the silage from the exposed surface, working it to the center of the silo where the blower tosses it down the chute.

It isn't even necessary to be present in the barn all the time the machine is in operation. Long explains that his silage cart holds 35 or 40 bushels of silage. It is run into the chute and the machine is turned on. This cart will be filled in four to five minutes. A time clock on the control device may be set to turn off at any time desired. In this way it is possible to start the machine and then go about other chores, knowing that it will turn off when the cart it full.

The conductor pipe from this machine is directed out of a silo door. Thus it is necessary to go into the silo and change the pipe every time a door of silage is used up. But, as Long is quick to explain, this is a simple matter compared with having to go into the silo once or even twice every day.

This particular type of machine is still new. In fact, Long installed his only last winter and he says it was the first in the state. But here is just another example of the way in which machines are coming along to replace more and more heavy hand labor.

Mechanization of our field work has meant less hours needed to grow a farm crop. We have not made similar savings in shortening chore-time hours. Here is a machine that will mean a step in that direction.

Synthetics for Puny Pigs

Condensed from Capper's Farmer

C. M. Anderson

How's a pound of shote gain for 2.29 pounds of feed? Five weanlings at Michigan Experiment Station turned in that record. They did it on a ration that ordinarily would be too heavy with corn and too light in protein to be safe. These 5 pigs had their feed spiked with d,l-tryptophane, which is found in protein.

If this spiking pans out in later tests, we'll have a new way to feed hogs. It will cut the amount of feed needed to make pork and will permit using a young pig ration with less protein supplement. Both savings would be helpful right now with the feed and meat shortage.

The ration was 87 per cent corn, 5.5 per cent commercial casein, 5.5 per cent soybean oilmeal and 2 per cent complex mineral mixture. Total protein was only 14 per cent.

Plenty of farmers have had pig and shote troubles with rations that high in corn and that low in protein. That's why Michigan workers mixed the feed that way. They wanted to learn what was wrong.

Ten pigs picked to try the ration were 6 weeks old and weighed 27 pounds. They were fed 6 weeks. Five of them got 200 milligrams of the tryptophane daily and gained a pound a day on 2.29 pounds of feed.

The other 5 pigs had the same ration without tryptophane. They finished up a sorry lot. Four developed severe diarrhea the fourth week, hair was rough and skin around the ears was scaly. When the pigs were posted, lesions were found in the intestines. In some cases gut walls were so weak they could be torn by moderate pressure.

Pig and shote diseases are increasing. Scientists often can't find any germ that might cause the trouble. So they think rations are short of something pigs need. Stunted growth, rough coats and diarrhea are old signs of too much corn and too little supplement. Lately intestinal lesions, ulcers and scaly skins have been found in pigs fed that way. Those were the symptoms found in the Michigan pigs which didn't get tryptophane.

Because these troubles are increasing, nutritionists think some needed element is getting

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shorter and shorter in the feed. Lower land fertility may be making the corn poorer. Maybe processing is taking too much of some important elements out of supplements. Or changing to protein sources that are deficient may be the cause.

Anyway, tryptophane seemed to supply what this Michigan ration lacked. The pigs appeared healthy. Their gains and condition told that they were well fed. After autopsy, 2 were found to have lesions in the colon. They evidently were not severe enough to affect gains or to make the pigs scrawny. Still the experimenters wonder if enough tryptophane was fed.

There is pretty good proof that lack of nicotinic acid, a vitamin B factor, in the ration will cause the trouble. Michigan workers found the pigs that had tryptophane got rid of more nicotinic acid in manure and urine that they ate in the feed. So they decided tryptophane must have made the niacin available some way.

W. N. McMillen, animal husbandman, believes these pig and shote troubles can happen in 3 ways: 1—By feeding a ration that is short in niacin. 2—By feeding too little of a ration even though it has enough niacin. 3—Or by colds or worms which throw pigs off feed and they don't eat enough to prevent the deficiency.

In addition to the low-protein ration, they also tested a high one —19.2 per cent. This contained 80 per cent corn, 12 per cent commercial casein, 6 per cent soybean oilmeal and 2 per cent complex mineral.

Five 39-pound pigs fed this ration from 8 weeks to 16 weeks old gained a pound a day on 3.09 pounds of feed. Three of them developed mild diarrhea within 4 weeks. Still the lot didn't seem to be extremely abnormal. But when the pigs were opened, the large intestines were thickened and doughy. There were some lesions. Inner linings were congested and covered with cheesy material.

Five 40-pound pigs 8 weeks old were fed the same ration to 16 weeks, with 30 milligrams of nicotinic acid a day. They gained 1.4 pounds a day on 3.64 pounds of feed and were normal in every way. That proved to the experimenters that nicotinic acid supplied what the high pretein ration lacked for the other lot.

To see if corn might be the source of these diseases, a third ration was tested. It contained 90 per cent oats, 4 per cent commercial casein, 4 per cent soybean oilmeal and 2 per cent of the complex mineral. Total protein was 15.9 per cent. Oats is low in nicotinic acid. Five pigs fed this ra-

tion from 6 weeks to 12 weeks gained 0.76 pound a day on 2.29 pounds of feed daily. They had rough coats and looked scrubby, but had no diarrhea and no intestinal troubles, except an accumulation of oat hulls in the colons.

"Some folks say pigs don't have these nutritional troubles on farm feeds," said McMillen, "But we've found plenty of them. We've also been going out and picking up groups of them to see if we can correct their troubles. By feeding a good ration, we have been able to snap them out of it in most cases."

He thinks much of the increase in shote troubles is because the pigs don't get enough protein when small.

Brome-Alfalfa Builds Beef

Bromegrass-alfalfa pasture is not only a first-rate soil builder, but is nearly tops as an efficient cattle feed, reports Iowa State College.

Cattle which were started on bromegrass-alfalfa pasture the first of May, and then full-fed ground, ear corn on pasture during the last part of the growing season, gained faster than the steers handled the regular way in the dry lot. The pasture-corn-fed cattle, showed an average, daily gain from the first of May to mid-September of 2.16 pounds per head. Steers fed in the dry lot averaged 1.97 pounds daily. Steers on pasture without corn averaged about 1.4 pounds daily per head.

The pasture-corn-fed steers ate less corn, too. They consumed but 21.7 bushels of corn during the experiment, compared with 36.4 bushels for the dry-lot cattle, or a saving of nearly 15 bushels of corn.

However, the pasture-fed steers lacked a little of the finish possessed by the dry-lot cattle, and were valued at a little lower price at the end of the experiment. From 30 to 40 additional days of dry-lot feeding would have been needed to bring them up to dry-lot cattle in both grade and yield. But the pasture-corn-cattle would weigh at least 100 pounds more per steer when finished.—Francis Kutish.

—*Successful Farming*

The Polish Peasant Becomes a Farmer

Condensed from Poland of Today

Andrzej Kierski

Economist and Expert on Poland's Agrarian Problems

For many centuries the Polish village reflected the feudal system which reigned supreme in Poland, as it did in the rest of Europe. A division into large estates and very small properties was only one aspect of this system. In actuality it created two separate social and cultural worlds, two distinct strata of society; the nobility and gentry on the one hand and the peasantry on the other. Politically, socially and economically the peasant depended entirely on the Lord.

The breaking up of the feudal system in Poland was extremely slow and gradual. It lasted through the entire 19th and well into the 20th centuries. Between 1919 and 1939 the process was hastened, when the first agrarian reform was passed. Meanwhile an independent political peasant movement sprang up. Nevertheless some of the old-time practices survived and were still an integral part of Poland's national life. Agriculture remained under the domination of the big land owners who, in addition to their economic privileges, pulled the political strings. But the peasant strove for one end—emancipation. His ideal was to become an independent farmer, working on his own land which would provide him with a decent means of support.

Before the war, 64 per cent of all Polish farms were small units not over 12 acres, and these small units covered an area not exceeding 15 per cent of Poland's total farmland. The large estates (240 acres and more) on the other hand, accounting for a mere 0.6 per cent of all Polish farms—covered 43 per cent of the entire arable area. The remainder were medium-sized properties. This necessarily made Poland a country of sharp contrasts. Side by side with a few large estates there were innumerable small, backward and debt-ridden properties, unable to provide their owners with the bare means of subsistence. There were 3,000,000 peasants in the pre-war Poland doomed to unemployment, and the country's undeveloped industry did not offer any outlet for this "expendable" part of the population.

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That is why even before the war the general conviction was that something would have to be done about the situation. The Land Reform Act of 1920 was handicapped by long delays, and carried out timidly and inefficiently, which in itself was not surprising, for the influence of the manor still prevailed in the Polish economy. Yet no one doubted that basic changes were inevitable and that the existing agricultural system called for radical reform.

September 6, 1944, marks a historic date for the Polish peasant. On that day the Committee of National Liberation published its land reform decrees, abolishing big property once and for all, compensating its owners, and dividing the estates among the peasants. In the course of three years over 800,000 families were settled on as many newly created farms in an area of 13,640,000 acres. The size of these farms varied—in accordance with the size of the family and the quality of the soil—from 12 to 24 acres, and in the Recovered Territories their size ranged up to 36 acres. Some 4,800,000 acres have been retained as reserve land mainly for future repatriates.

These new farmers are recruited for the most part (about 97 per cent) from those who, before the war, had owned only so-called "miniature" farms, or had been tenants or landless laborers. Many are repatriates and settlers from those parts of Poland which at present belong to the Soviet Ukraine or Byelorussia.

There are no large private estates left in Poland today. With them disappeared also the age-old division into manor and cottage. An era in the history of Poland had come to a close. Poland's peasants became independent farmers with property of their own, none too large, but sufficient for the owners to make a decent living. Still another phenomenon disappeared together with the manorial system—those 3,000,000 "expendable" peasants. Part of them received land, the others were absorbed by the fast-growing industries.

The recovered Territories were of invaluable use in this process. They provided 163,000 new farms for as many peasant families. There can be no doubt but that without these lands the tremendous problem posed by the social and economic transformation of the Polish village could not have been solved.

The redistribution of land is only the beginning of a much wider agrarian reform program, which tries to deal with other equally important and urgent problems. One such problem is the commassation of scattered farm lots. It may well happen,

for instance, that a peasant finds himself in the awkward and annoying situation of owning a dozen or more small fields, each separated from the other by miles of walking distance. This not infrequent phenomenon is due largely to division of inherited property, to acquisition by marriage, purchase, or some other incident in the peasant's life. At this moment, the land which is thus divided and subdivided into tiny lots, forming as it were a checkerboard, is estimated to cover 6,400,000 acres.

It has long been a dream of the Polish peasants to have this evil remedied. They knew only too well that a property cut up into small parcels could not be worked efficiently, and consumed a great deal of time and energy. There had been some attempts at commassation before the war, but progress was extremely slow. One of the provisions of the present Three Year Plan has been to integrate 400,000 acres in 1947, 360,000 acres in 1948, and 550,000 acres in 1949. In this manner one-sixth of the "checkerboard" area could become integrated by the end of the three-years.

It is doubtful, however, whether it will be possible to accomplish this task. Commassation is extremely difficult and costly. A farmer who owns three lots of bad land, while the rest is good soil, will not be willing to exchange it for bad soil only. Besides, there are other problems which present considerable difficulties.

Many of these problems will be solved as soon as the soil has been improved. But this again requires substantial investments of money and labor. Some regions have to be drained, others irrigated, and the sum needed for such an undertaking has been estimated at 400 billion zlotys, a truly fantastic amount for Poland. The investments already made total about 160 billion zlotys. The preservation and extension of these improvements will cost 2.8 billion zlotys in 1947.

No matter what the cost of building, it's always cheaper than machinery. No building on the farm will pay better dividends than the machinery shed. And no labor will pay a better return than that spent in oiling and greasing machinery before winter storage.

—*N. J. Farm and Garden*

How Soils Nourish Plants

Condensed from PhilFarmer

Wm. A. Albrecht

Chairman, Department of Soils, University of Missouri

JUST how plants can nourish themselves from the nutrient supplies in the soil has been a challenging question since the early part of the nineteenth century. The accumulated information to date on this question has listed, as essential for the plants, more than ten elements taken from the soil. It has also listed some other elements not considered necessary for plant growth, but delivered by the plants and demanded for the nutrition of animals and man. It has illustrated the sources of the nutrient elements in the rocks and minerals. It has brought us to understand how the plant roots and the soil get together so the plant can obtain the nutrients it needs and in such balanced amounts that permit it to make itself the particular products for which we grow it.

When we select the various vegetables and meats for our diet; when animals select some particular plants as their feed and discriminate among them according as the plants are growing on particular fertilizer treatments of the soils; is it too much of a stretch of the imagination to believe that as the plants are sending their roots through the soil they are selecting the elements by which they balance their diet? If your imagination is equal to it, will you not follow through with us in thinking about that possibility?

That the plant nutrients may be taken in the form of water solutions is a concept that was once helpful, but one that has been found insufficient to explain how plants are nourished by the soil. We know, of course, that plants grow afloat on water. They take their nourishments from solutions there. In botanical class demonstrations the plants have been grown with the ten or more nutrient elements dissolved in water. Then when the new practice of hydroponics came along, it proposed the growing of crops extensively in circulating dilute nutrient solutions. When such have been our observations and academic practices in providing nourishments for plants, it is not surprising that we should incor-

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tions of the nutrients must be rectly imagine that water soluflowing into plants from the soil as the method through which our crops are nourished by the soil fertility.

Some recent studies used only a suspension of the clay fraction of the soil as the nutrient medium for plant roots. These trials demonstrated that plants will grow well on a clay with nutrients adsorbed on it, and from which none can be washed or filtered out even under high pressure. Such facts tell us that we cannot logically hold to the belief that water going into the plants from the soil is sweeping the supply of their nutrients along with it.

It is now more nearly the truth to visualize that the water is moving up through the plants from the soil according as the meteorological forces causing its evaporation from the surfaces of the leaves are stronger than the forces of the soil holding the water against its movement into the roots. This water movement is normally upward when the forces of evaporation exceed those of adhesion of the water to the soil. But its movement can be reversed and water can be made to move from the plant back to the soil if the soil becomes very dry and the active leaves are removed.

Movement of the nutrients, too, can be in both directions; that is, from the soil into the plant and from the plant back into the soil. The directions of such movements by the nutrients are not determined by the direction of movement of the water, seemingly no more than fish in a stream should swim only with the current. Instead, the movement of the nutrients is determined mainly by differences in concentrations of these items of fertility as they are adsorbed on the clay-humus colloidal complexes of the soil.

The rate and amount of movement of the nutrients are influenced by the composition of the plant roots. It has been shown that the more proteinaceous roots of inoculated legumes took more nutrients into the plant from off the clay than did the roots of plants with no nodules. Nutrient movement into the plants is determined not by water movement into them. Rather it is determined (a) by the root as it is one colloid in contact with another, namely, the soil colloid and (b) by the concentrations or activities of the exchangeable nutrients adsorbed on each at, or near, the points of contact. The nutrients in the soil move, therefore, under laws controlling their specific behaviors. They move quite independently of the movement of water and of the laws controlling water dynamics.

If nutrients were merely swept

in and left within the plant by the water transpiring or evaporating from the leaves, it would be impossible to explain the much higher nutrient mineral contents of the short grasses under the low rainfall of the drier western prairies in contrast to the lesser fertility contents in the tall prairie grasses under the higher rainfalls of the areas much farther east. It is under the higher rainfalls, or where the maximum of water has gone from the soil through the plants, that plants have the minimum of nutrients per ton of plant mass. Surely we cannot hold to the old idea that the plant is getting its nutrients in simple water solutions passing through and depositing them from the transpiration stream. We must understand the clay of the soil and its chemico-dynamics by which this soil separate helps or hinders the nutrition of our crops.

It was some research on the problem of "soil acidity" that brought the discovery of the clay as a great filter taking the nutrients out of their dilute solutions and concentrating them on its surface. We now know that nutrients are held in the soil by the clay. We know, too, that they can be exchanged to the roots of plants as these are trading acidity for them.

Fortunately, the clays of the Cornbelt and other regions of moderate temperature and no greater rainfall have a large exchange capacity. It is this large capacity to carry on exchanges that makes these soils so very acid when they are stocked with hydrogen, a non-nutrient, in place of other positively charged elements which are nutrients. But this large capacity for acid is a correspondingly large capacity for fertility. We are just coming to realize that the natural soil acidity resulted because the clay gave up the fertility to the growing plants in exchange for the acidity they offered.

The acid clay can readily be restocked with nutrients. In doing this, the nutrients must replace the hydrogen or the acid. Nitrogen put into the soil as ammonia is taken on by the clays. In being so taken, it displaces some of the acidity there. Potassium, as a fertilizer, behaves similarly. Calcium as a salt of sulfuric acid, or gypsum, is taken and held by the acid clay only if the calcium pushes some of the weak acid off the clay to make of it a stronger sulfuric acid in the soil. And yet, in spite of this resulting stronger acid, the calcium sulfate, or gypsum, as a soil treatment has long been recognized to be beneficial to clover. Calcium as a salt of carbonic acid, or as limestone, has also been more widely used to grow better clover. This calcium as a carbonate also pushes acidity off the clay when

duces carbonic acid in the soil. But this weak acid decomposes leaving only water while the accompanying carbon dioxide escapes to the air. Thus we see that both fertilizing and liming have been removing acidity from the soil.

We have, however, emphasized liming for clover while erroneously believing it beneficial because the hydrogen was driven off the clay. Rather, we should be more correctly emphasizing it because the clay was being restocked with calcium as a nutrient for the clover crop. Liming the soil is a case of fertilizing or restocking the clay with calcium. In like manner, putting on potash fertilizer is a case of restocking the clay with potassium. It, too, just like calcium or lime, replaces some of the acidity there. Fertilizing then, like liming, also reduces soil acidity; but we have used so much less fertilizers in comparison to lime that we have not appreciated the importance of acidity in the dynamics of the soil for plant nutrition.

New Quackgrass Killer

Newest and brightest hope for the long-sought control of quackgrass and other troublesome, grassy weeds is the chemical called ammonium trichloroacetate. Though it is so new it has been tested only by a few investigators, it has given excellent control of foxtail, barnyard grass, and quackgrass.

The material is a liquid, and thus can easily be sprayed on the grasses which are to be eradicated. This gives the material several advantages over other so-called grass killers, which not only would not dissolve in water, but needed to be mixed with the actual roots of the grass in order to be effective.

The new chemical, if further tests continue to show as good results, might make sweeping changes in the weed-control methods of sugar beets, potatoes, tomatoes, and many other crops where grass is a problem.

—*Successful Farming*

Harvesting Badly Needed Native Grasses

Condensed from Seed World

E. W. Jenkins

THE need for native grass seeds to use in replanting depleted range and abandoned crop land is acute in several parts of Texas. At one west Texas location farmers and stockmen recently have gone so far as to design and build their own power harvester in an effort to get an adequate supply of certain range plants. In a number of Texas neighborhoods farmers have worked together to construct special attachments to adapt regular combines to native grass seed harvest.

The rising demand for native grass seed, instituted principally by soil conservation districts, is becoming of significant interest to major seed houses. For example, the San Antonio office of one seed firm advertised the other day for 20,000 pounds of sideoats gramma seed. Other seeds in demand for use in establishing range include big and little bluestem, Indiangrass, sideoats and blue gramma and the new King Ranch strain of yellow bluestem which the Soil Conservation Service has developed. Small amounts of some of those seed as well as an occasional pound of buffalo and sand lovegrass turns up for sale, but for most of the important native and adapted range grass seeds there is no steady market.

One reason for the shortage of the wanted grass seeds is that harvesting them is a difficult task. Conventional machinery won't do the job without special adaptations such as flaps or brushes on combine reels to help push tall bunch grasses into the machine. Most of the better seeds are in small plots and often those are located at isolated points. Roadside ditches, fenced off corners of fields and similar locations where stock don't graze are likely spots. Any harvest machine, therefore, needs to be small enough to go all sorts of places and rugged enough to stand the punishment of rough terrain. Even when the desirable plants are located on fairly level ground they offer a number of harvesting difficulties. Uneven ripening in the seed is one common trouble.

But the farmers living in the Upper Leon and Brown-Mills soil conservation districts at Rising Star need seed so badly that they are willing to do almost anything possible to harvest them.

Reprinted by permission from the Seed World, Chicago, Illinois, October 17, 1947

They have 13,000 acres of overused range land and worn out crop land lying within 25 miles of Rising Star which need planting to good native grasses that will produce beef and mutton and profits.

As will be observed, production from 13,000 acres is an important factor in the economy of a rural neighborhood. So, to get seed for that 13,000 acres, one neighborhood group of conservation farmers summoned their own resources, called on their soil conservation districts, local merchants and agricultural agencies for help in constructing a mobile grass seed harvester. The result of the efforts of that unit of farmers, the Hickman Conservation Group, is a workable harvester that may become the model for many future machines.

When the Hickman Group farmers approached W. L. Garner, Soil Conservation Service technician at Rising Star, he suggested that needed native grass could be stripped off the seed head between two rubber bats revolving in opposite directions. That procedure would take only ripened seeds and would leave the stalk intact to produce other mature seeds later and those could be harvested on a return trip.

With Mr. Garner's specifications in mind, the harvester was built. The reels were designed to strip the seeds just as he suggested and the bottom reel, eight inches in diameter, was made of four rubber bats. These, incidentally, were made of three strips of an old truck inner tube, each of them three inches wide. They were separated by quarter-inch wood lathes bolted to a specially built axle. The upper reel was a regular combine reel with eight bats made like the lower bats except that it had only two rubber strips. The upper reel pulled the seed heads between the two reels. With the bottom reel running relatively fast, the seeds shattered into the seed pan and as the machine moved forward, the threshed stalk was pulled under the machine and new seed stalks showed up between the bats.

A seed pan made of sheet metal and provided with a slide opening at one end where seed can be raked out is used on the harvester. Some grass seeds are small, others light and fluffy; for that reason it did not seem practical to build an elevator or auger to carry the seed to a sack where some of them might have been lost. An elevator also would have made the machine too bulky. And since the average seed plot is small, raking out the seed offered no difficulty.

The reel height is adjustable; from eight inches off the ground to 36 inches. A windlass on top

of two upright supports handles that adjustment.

The seed pan and reels are mounted on a rear automobile axle and an air-cooled motor propels the harvester. Two automobile transmissions help reduce the motor speed from 1,600 to 30 r.p.m. on the drive shaft and a flat belt off the motor to the main drive also serves as a clutch. One transmission is fastened to the main drive and the other to the drive shaft of the rear axle. A roller chain drive between the two transmissions also reduces the speed. With the transmissions in the various gears, ten forward speeds and a reverse are possible.

The motor used is six horsepower, which has proven more than adequate. Speed reducing gears would be a great advantage in dissipating the speed.

The harvester is guided by a small wheel at the rear. The operator sits on a seat and holds the steering arm in his left hand and guides the machine like a boat. With his right hand the operator shifts gears and operates the clutch and throttle.

In moving a short distance the harvester will propel itself at about 12 miles an hour. For longer hauls it can be hooked behind a car.

Money for the harvester came from a $200 award the Hickman Group had won in a Fort Worth Press conservation program. The group plans to loan the harvester to any farmer who has seed to harvest. The farmer will keep a third of the seed for his own use, the Hickman Group will take a third to sell for expenses, and the soil conservation district will get a third to use in revegetating land in the vicinity.

Spraying on the Hoof

Homemakers aren't the only ones that have moth trouble. United States Department of Agriculture entomologists have sprayed DDT on more than a million bales of wool in warehouses.

Now comes Dr. Leonard Haseman of the University of Missouri with a new idea: why not moth-proof the fleece before it's shorn?

By dipping the sheep in DDT you not only protect the fleece against moths for as long as two years, but you protect the sheep against lice and ticks, Dr. Haseman says.

Unfortunately, the effect doesn't last over to moth-proof the cloth, for the wool scouring process takes out the DDT.

Farm Journal

$300 a Ton for Hay Sold to Soil

Condensed from Montana Farmer-Stockman

Herbert H. Jilson

"If I were to cut and stack that hay it would cost me $300 a ton."

Harry Gander, applegrower and dairyman in the Summerdale district of the Bitter Root Valley, was speaking. The hay he was referring to was the alfalfa and sweet clover growing between his rows of McIntosh apple trees.

"It took me a time to find it out," Gander smiled. "For years I'd go in there and make a cutting. I didn't know it, but I was taking a loss. Finally I noticed how the apple yield varied from row to row. I did a little experimenting and now I have figures to show how wrong I was."

As an irrigation farmer on the well-watered east slope of the Bitter Root, Gander, in the 20 years since he brought his family to a 10-acre tract in the fertile western Montana valley, has demonstrated his farming ability. Today Gander owns and operates 90 acres irrigated by the Bitter Root irrigation district canal. Of this, 11 acres are in orchard, 30 acres are planted in alfalfa, 10 acres in oats, and the balance is largely given over to pasture on which he runs 20 head of Guernsey milk cows.

Before 1940 Gander conducted his dairy farming and apple growing according to methods more or less standardized throughout the west. The 11 acres given over to apple raising were divided into five orchards, each averaging about 200 trees, and sown in alfalfa and sweet clover. During the summer the dairy herd grazed through three of the five plots. Two orchards were not disturbed during the growing season. These orchards furnished hay crops which augmented the herd's supply of winter feed. The hay orchards received little fertilizer. The pasture orchards received the benefit of cattle droppings and urine.

"In 1940 I changed this practice," Gander said. "I noticed that the trees on the outside rows —particularly in the orchards where I had been taking the alfalfa and clover for hay—were giving the greatest yield. I reasoned that this was because they were drawing nitrogen and other needed elements from the plants growing there, or were tapping the cultivated land for the minerals being released by the vegetable matter which was worked into the soil.

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"So I decided I wouldn't plan on taking a hay crop out of the orchards that year, and that spring I disced in the alfalfa and clover in the two orchards. It was one way to find out if I had been robbing the trees of needed minerals."

That fall there was a marked improvement in the apple yield. Trees that formerly had averaged only two or three boxes were picked to the tune of six or seven. There was a noticeable improvement in the coloring and texture of the leaf and the general health of the trees.

"However," Gander added, "the outside rows still had the edge. I decided that if a little was good—more was better. The following spring I not only cultivated between the rows but added treble phosphate."

It had been Gander's practice to fertilize his orchards with manure—and this he also increased in amount per acre. The application of treble phosphate at the rate of 6 to 12 pounds spread within the radius of the outer limbs of each tree was made as a supplementary measure.

"Commercial fertilizer can do little good unless the soil has plenty of humus and nitrogen furnished by well-disced vegetation and manure," Gander pointed out. "But when the other two are present, the addition of commercial fertilizer is very effective."

The 1941 apple harvest proved Gander's reasoning to be correct. Trees in the two orchards yielded from 10 to 11 boxes of choice McIntoshes. One orchard of 369 trees went to 4,986 boxes.

"That's why I figure taking a hay crop out of the orchards would cost me $300 a ton," Gander stated. "I have read of experiments showing that one ton of alfalfa hay removes from the soil between 30 to 50 pounds of lime—and other minerals in the same proportion.

"Here's why," he continued. Take one four-acre orchard. The hay stand will yield four tons. Say that the hay is valued at $10 a ton—which is a fair market price. I have cut $40 worth of hay.

"I also have an apple yield of 600 boxes from the orchard. If they bring the average of 75 cents per box, I have an apple crop worth $450 and my four acres have made me $400.

"Now if I disk in the *alfalfa* and clover in the spring—work the vegetation deep into the soil—strengthen it with manure and commercial fertilizer, and forget about making hay, I can increase the apple yield to an 11-box average or 2,200 boxes to the acre. At 75 cents a box my crop is worth $1,650. I have increased my gross earnings by $1,160 for the four

acres, or roughly $290 an acre. It would cost me that to cut the hay."

Gander believes that $300 an acre is a better figure to illustrate the increase because of the year-to-year fluctuations in the valuation of hay and apples. In the past few seasons apples have been bringing high prices. Some years he figures the uncut hay to be worth $400 a ton.

In the three orchard-pastures where Gander runs his 20 head of dairy cattle in addition to some young stock, a similar practice is carried out. The orchards are fertilized with ammoniated phosphate at the rate of 175 pounds to the acre. In addition, treble phosphate is spread around the individual trees.

The apple yield from the five orchards runs somewhat the same, with the trees in the two cultivated fields giving a slightly heavier crop.

"It's a matter of give-and-take," Gander explained. "If I didn't employ methods designated to restore the soil I couldn't show a profit at either dairying or apple raising.

"It would be like writing checks on a dead account. By utilizing part of the orchards as pastures I am giving the cattle shady grazing. In turn, the cattle droppings and urine do wonders for the soil and make it possible to grow more apples.

"In the orchards where I don't run stock," Gander added, "I have found that cultivation and the use of fertilizer will bring the same—and sometimes better—results."

Gander classes his successful apple growing operations as a sideline, and thinks of himself as primarily a dairyman. To him orcharding can be a profitable and safe undertaking only when combined with other types of farming which lend themselves to such a partnership.

"Orcharding is a good business for the small farmer when it is tied in with hog raising, small-scale livestock raising, or dairying," he said. "You take too many chances when orcharding is your sole business. You have to worry about hail, early freezes, and blight.

In common with others who have taken their chances in an uncertain business, Gander has a deep regard for the soil. In 1911, he settled in eastern Montana, after a stint of school teaching in his native Iowa.

"Those were the days when the government bet you 160 acres against $22 you'd starve to death," Gander recalled. "I had 4 cents in postage in my pocket after I had filed on my land. I went to work cooking for a sheep camp. In 1916 my wife and I were married and we started

farming in earnest, and in 1928 we moved here."

Harry Gander's regard for his land is a lasting respect. He knows what the soil can do if properly cared for. To him, the careful nurturing of his orchards and fields represents more than an increase in his profits; it is Gander's way of carrying out an obligation to himself and the future.

"You have to think of the fertility of the land first, last and always," he explained. "It's only fair that what you take out you have to put back in. I think every farmer feels that way, even though there are times when a dollar looks as big as a cartwheel and he can't afford to replenish the soil. All he can do is keep planting and hoping for a good year to bring him out from under. No farmer is a soil robber — but sometimes he gets shoved into it.

"Right now I'm putting out money and effort to keep the soil in good shape. And I'm making money at it," Gander continued. "But I'm trying to do more than that. I feel this way: I don't own this land — I have a 'lease' on it. When I'm gone somebody else will have a 'lease' on it. It's my duty to leave this land in as good — if not better— a condition as it was when I took it over."

Shipping Fever

The exact cause of this disease is not yet known, according to veterinarians at the Oklahoma A. and M. College. It is a blood poisoning, and often runs a short, fatal course. In many localities it is known at hemorrhagic septicemia.

Losses are most likely to occur during bad or changeable weather during the fall, winter, or early spring. They occur most frequently among young animals, especially those that are thin and poorly nourished. Overcrowding, irregularity in feeding and watering, and a hard driving previous to shipment encourage the condition.

Shippers are advised to rest cattle carefully before loading them. Avoid heavy fills on water, but give some good non-legume hay instead.

—*Successful Farming*

Feed Protamone

Condensed from Hatchery Tribune and Feed Retailer

Chas. W. Turner

University of Missouri

While the feeding of hormones to poultry is still in an experimental stage of development, the reports coming out of the laboratory of the effects that poultrymen may expect from these new scientific discoveries raises the hopes that endocrinology may contribute as much in the future to improved poultry production as the vitamins have in the recent past.

Since feeding hormones to control physiological processes is an entirely new development, the object of this note is to record the present status of research in this field.

The hormone called PROTAMONE will be the first to become available to the feed industry. The product is a synthetic thyro protein, similar to the natural hormone secreted by the thyroid glands. Research of the past few years has indicated the great importance of the hormone secreted by these glands. It has been shown that if the thyroid glands are removed from chicks, body growth and feathering is delayed, whereas, in laying hens, egg production is greatly reduced. The lack of the thyroid hormone causes all the cells of the body to function at a slower rate. The appetite is reduced and natural pep and vitality is at a low level.

In work at the Missouri Agricultural Experiment Station, it was shown that a number of factors influence the normal thyroid hormone secretion rate. First, there are breed and strain differences. The white Leghorns, during growth, secrete, on the average, about 10 per cent more hormone than do White Plymouth Rocks of the same body weight. This is believed to explain in part the differences in body type and temperament of these two breeds.

Second, thyroid hormone secretion is influenced by environmental temperature. In cold weather the hormone is secreted at a rapid rate, whereas in warm weather the thyroid gland slows down and in hot weather almost stops secretion; depending at that time upon the stores of hormone in the gland follicles.

Third, the rate of thyroid hormone secretion decreases with advancing age. This accounts for the decline in bodily activity, ap-

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petite, egg production, rate of feather growth, etc., in older birds.

With the development of protamone, which is a synthetic thyroid hormone produced in the laboratory and now in a factory by the combination of casein and iodine under certain conditions, there will soon be available for poultrymen an addition to feeds which will substitute for the bird's own thyroid gland secretion. By the feeding of very small amounts of protamone, birds with hormone secretion rates below normal, due to their inheritance, environment, or advancing age can be favorably influenced.

Chicks vary a great deal in growth rate. Some grow slowly, some grow fast. A number of factors influence the growth rate of secretion of the thyroid hormone. Remove the thyroid and growth and feathering slow down —feed added thyroid and growth and feathering are increased. Probably the beneficial effect is most pronounced in the groups of chicks below the average in growth rate, since their growth is limited by their inherited thyroid hormone secretion rate. By increasing the thyroid hormone available to them by feeding protamone, their rate of body and feather growth is increased and the average growth rate of the entire group is increased. Strains of very rapid growing chicks would be expected to respond less to added protamone than would slower growing birds.

The feeding of protamone can be started at hatching time. For optimum body growth, protamone can be incorporated in the starting ration at the rate of 15 to 20 grams per 100 lbs. feed. If slow feathering is a serious problem, it is possible to feed twice the above amounts with further improvement in feather growth without affecting body growth.

For broiler production, we recommend that protamone be stopped abruptly at 8 or 9 weeks of age. Rapid fattening occurs during the following three to four weeks, since the birds' own thyroids are inactivated by protamone and they require several weeks to return to secretion again. *Fattening* is most rapid in the *absence* of the thyroid hormone.

For growing pullets, the protamone feeding can continue at the rate of 15 to 20 grams per 100 lbs. of their total feed until the approach of sexual maturity. The protamone can then be cut to 10 grams per 100 lbs. of total feed.

The research work of Prof. H. L. Kempster, at the University of Missouri, indicated that the growth rate of chicks was slowed down during the summer months. As indicated above it has been

demonstrated also that the thyroid hormone secretion rate is decreased during high environmental temperatures. We interpret the reduced growth rate as due in part to the lowered thyroid secretion rate. By the feeding of protamone during the summer months and thus maintaining the thyroid hormone available to the birds, part of the depressed growth rate should be eliminated and broiler production should be maintained at a profitable level during the summer.

The feeding of protamone to pullets has led to variable results. White Leghorn and production-bred Rhode Island Reds seem to respond to protamone-feeding only during the spring and summer months by a more sustained egg production than the control birds under Missouri climatic conditions. These results are interpreted as indicating that the inheritance of the thyroid secretion rate of high egg-producing breeds and strains is optimal for winter conditions.

As the out-door temperature increases in the spring and summer, the thyroid hormone secretion gradually declines and carries down the egg production with it. When protamone is fed where summer environmental temperatures are high for long periods, the thyroid hormone deficiency is replaced by the oral absorption of the hormone in protamone. This tends to maintain the egg production at the high level attained during the winter and early spring through the summer months. In most cases the feeding of protamone has not prevented molting in the fall.

During the past year, groups of White Plymouth Rock pullets have been fed protamone in comparison with control birds. In this experiment the protamone-fed birds increased in weekly egg production more rapidly than did the controls during the fall and winter, and through the year have been laying at a weekly rate of 10 to 20 per cent above the controls.

During the winter months they produced between 70 and 80 per cent production per week in comparison with 50 to 60 per cent for the controls. I interpret these results as indicating that this strain of white Rock pullets have the inheritance for relatively high egg production except for thyroid hormone secretion rate. When this single deficiency is supplied by protamone-feeding, the favorable results are very striking. Where this breed of chickens are favored for broilers, it would appear that protamone-feeding will improve the egg production materially.

The feeding of protamone to laying hens in the summer has also been shown to maintain the thickness and quality of the egg

shells in contrast to the decline which normally occurs.

Up to the present time, the effect of protamone-feeding upon the sperm production of roosters and upon the fertility and hatchability of summer and early fall eggs has not been studied. However, in other livestock, especially the ram, protamone has had an important effect upon sperm production. Hatcherymen are in an especially favorable position to run such practical experiments. The excessive loss due to infertile eggs and reduced hatchability in the fall may be reduced.

It is recommended that about 10 grams of protamone per 100 lbs. feed be fed to laying hens. If the feed consists of grain and mash, the protamone can be mixed in increased amount in the mash feed so that the same total protamone will be fed. We have been feeding protamone continuously to laying hens now completing their sixth laying year. In their egg production each year is comparison with the controls, greater and greater. In other words, while the controls are declining each year in egg production, those fed protamone are holding up much better. In fact, this year their average egg production will be greater than in either of the two previous years. Even though they have been stimulated to greater egg production for several years, their mortality rate is actually less than in the control group.

To what extent the continuous feeding of protamone will enable poultrymen to keep their hens at a profitable level beyond the pullet year, remains to be investigated. Valuable breeding birds which have demonstrated, by their progeny performance, the ability to transmit valuable characteristics, could be kept in reasonably high production for many years. This should, in time, lower the cost of breeding operations and eventually lower the cost of "egg-inheritance chicks" to chick buyers.

Making Water Wetter

Condensed from American Forests

For many years men have accepted the fact that water is wet and have used it with varying degrees of success in fighting fires without much thought of making improvements on it.

However, with the dawn of the empirical age and the cracking of the atom, chemists looked at water and found it wanting in some respects. It might well be, they admitted, that water could be made wetter and given a greater penetrating quality by changing its basic characteristics.

This was done, and the fall of 1946 saw the introduction of a new wetting agent — a wetter brand of water—produced by Arnold Hoffman & Company, of Providence, Rhode Island, and given the name of "Drench."

"Wet" water is water to which a chemical wetting agent is added to increase its penetrating action. Such an agent increases the saturating action of water by reducing the surface tension to keep it in globular droplets when sprinkled on any surface. For example, put water on a piece of paper from an eye-dropper—the drops retain their spherical form. Add a wetting agent and the drops spread out and soak into the paper. This is the principle on which wetting agents work, the cardinal factor being the penetrating quality of the liquid which permits it to get beneath the surface of a conflagration in a hurry.

Wetting agents were developed originally for the textile industry to make bleaching or dyeing solutions penetrate fabrics thoroughly and evenly. Experts quickly realized that the new product could be a priceless boon in fighting fires, including sawmill and woods fires.

Not long ago a threatening blaze started in a planing mill in Coventry, Rhode Island. The mill was a frame building. The main floor was stacked with lumber and the open-end basement with wood shavings to a height of seven feet. The fire, which had started when a workman was priming a gasoline engine flashed down through the loose floor planking into the perfect fuel beneath where it was fanned by a brisk breeze. This created a serious situation in a few brief seconds.

Among those answering the fire call was Warden J. R. Hill with 650 gallons of "wet" water in the booster tank of his pumper truck. Warden Hill had two openings

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made in the floor and inserted his fire nozzle. At the same time he ordered a two-and-a-half inch reserve line connected to the nearest hydrant, 1,200 feet away.

But by the time his men had returned from making the hydrant connection, the fire was out. Later examination showed that the entire pile of shavings was completely drenched and that the water had penetrated two inches into the earth beneath.

In August, a fire broke out in grass and manzanita brush on the Fort Ord reservation in California, and Chief F. B. W. Ernst and his firemen used five gallons of "Drench" in a tanker containing about 650 gallons of water. Application was made through a one and one-half inch line with a fog tip under about 50 pounds of pressure.

Chief Ernst reported that "an appreciable amount of time was saved through an apparent action of stretching our volume of water —in other words, it was necessary to use less water to completely cool the hot mold and duff. This can be attributed to the fact that our extinguishing agent was penetrating through this material and into the dirt underneath, without evaporating to an abnormal extent."

The Maryland Department of State Forests and Parks also was quick to recognize the value of this extinguishing agent. Findley Burns, editor of *Old Line Acorn*, wrote in a recent issue that "it not only puts a fire out in quick time, but because of its drenching action eliminates the need for a good portion of the mop-up work."

That this new product is highly effective has been attested by a representative cross-section of foresters and forest owners, as well as by sawmill operators and a number of fire chiefs who have used the product. To date, tests made and the use "Drench" has been put to in actual emergencies, indicate that its chief value to woodsmen has been in reducing the length of mop-up operations by quickly quenching burn-in stumps and duff; in saving water, a potent factor when used in fighting woods fires where water hauls are long and arduous; and by being the answer to a sawmill operator's prayer in putting out fire in a sawdust pile.

Film Seals in Freshness of Fruit

Condensed from Florida Grower

R. J. Buskirk

ORANGES from Florida's unusually productive Indian River section last year moved to a market in limited quantities in a "second skin" of transparent, moisture-proof film which preserves the delectable tree freshness of the juice-heavy fruit and reduces weight loss and spoilage.

This additional "skin" of minute thickness, stretched around the orange like a tight-fitting glove, is applied to the fruit by a novel and complex machine capable of "dressing" as many as 800 oranges in a single minute. The cost on a volume production basis is estimated at about one-tenth of a cent per orange, comparable to the cost of applying the non-functional paper wraps commonly used.

Designed and built for a candy bar manufacturer by William S. Cloud, Chicago inventor and engineer, the machine has been in operation this season at the Oak Hill Co-Operative Fruit Packing house, where it has been observed with enthusiastic interest by members of the Florida Citrus exchange.

Cloud's machine, according to Otto Schnering, president of the candy company, represents an investment of more than $150,000 and some six years' study and development work on the part of Cloud and his staff of technicians, representatives of the Citrus Exchange, Pliofilm experts of The Goodyear Tire and Rubber Company, and Dr. A. L. Stahl, of the Agricultural Experiment Station at the University of Florida.

Market studies, conducted in Columbus, Ohio, and at the New York Auction house, have shown fruit so wrapped having an excellent acceptance in both wholesale and retail outlets, giving members of the exchange reasons for serious consideration of this revolutionary marketing procedure.

Tests at the University of Florida, conducted by Dr. Stahl over a six-year period on various types of oranges when in season reveal that Pliofilm-wrapped oranges show a negligible weight loss, they retain their tree-fresh flavor and color at room temperature for at least six to eight weeks after picking, with these qualities retained for still longer periods when kept in cold storage. This in contrast, according to Stahl, to the rapid dehydration or weight

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loss, the loss of flavor, and fading color of oranges offered under standard procedures today.

For instance, Dr. Stahl found that unwrapped Valencia oranges at room temperature over a four-week period show a weight loss of more than six times that of film-wrapped fruit. At the end of the four-week period the unwrapped fruit was determined unmarketable. In cold storage unwrapped oranges lost 10 times more weight than those in film over a 20-week testing period.

Of perhaps greater importance than effectively reducing weight loss is the action of the film in retaining the original taste, vitamin content, and appearance of the fruit. Taste of the protected oranges at 37 degrees (cold storage) remained unchanged in Dr. Stahl's tests over a 20-week period, while unwrapped oranges lost their original taste and vitamin content after four to six weeks' time. At room temperature, too, unwrapped oranges showed dehydration and change in taste within two weeks' time, while those in film showed little or no change four weeks longer.

Another feature of this film is that while it does not prevent spoilage of infected fruit, it does prevent "nesting" or spreading of the infection to other fruit in the box.

Oranges at the Oak Hill plant undergo the standard procedure of washing, waxing, polishing, sorting, and grading before they move to a fast-moving conveyor belt which carries them to the Cloud machine. Picked up from the conveyor belt by another belt fitted with lugs, the oranges are carried five abreast to the top of the machine where they are chuted by gravity to a feeding cylinder, which as it revolves, feeds the fruit between two rolls, each containing cups into which the oranges fall as the rolls revolve against each other.

Two sheets of Pliofilm fed from rolls at opposite ends of the machine pass over heated rolls to become plastic, after which they are gripped by a series of fingers on both sides of the machine. Operating on cam tracts, the fingers stretch the heated film sheets to six times their original size, feeding them over the revolving cupped drums. Suction draws the thermoplastic film into the cups as the oranges drop, permitting the two sections of the film to seal themselves tightly around the fruit.

As the drum revolves, the oranges and surplus film pass to another cupped conveyor where the surplus film is trimmed by heated wires and is brushed away by rapidly revolving brushes, leaving the oranges untouched in their new "skin." They are then carried away by conveyor belts

to bins where they are packed for shipment.

Work on the Cloud machine was started before the war at the suggestion of the Citrus Exchange, after Dr. Stahl and his associates in early experiments had found that this film offered great possibilities in the preservation of oranges for marketing both in and out of season. Similar machines can be built to handle all citrus and tropical fruits.

Claims 70% of Milk from Good Roughage

Condensed from American Agriculturist

A. James Hall

PROF. CARL B. BENDER, research specialist in dairy husbandry at the New Jersey College of Agriculture and Experiment Station, has made many tests in this group of 9 silos at the State Dairy Research Farm at Beemerville, in Sussex county.

Bender's work with grasses and molasses and later with corn meal and other preservatives is responsible to a large degree for the wide-spread use of grass silage in the Garden State. He contends that in New Jersey grass is cheaper than corn. He contends, too, that farmers must use good grasses and legumes for silage "because you can't make something out of nothing."

Bender likes grass silage. But he likes good hay, too. He says that we must balance the silage with good hay that provides essential vitamin D.

"A dairy cow is designed primarily as a roughage burner," he said. "She is a grazing animal if you will give her something to graze. However, it is so much easier to feed grain than roughage that many dairymen have tried to make grain burners of their cows.

"Dairymen have found that with good quality roughage, 12% and 16% protein grains give just as good production as formerly obtained with 20% and 24% feed. Lots of experiments have proved this but it took a national emergency and feed shortages to demonstrate it to the majority."

In a test two years ago a group whose herds averaged 8,760 pounds of milk against the State average of 6,500 pounds fed 3,640 pounds of grain to get the high production. These cattle got only 8.9 pounds of nutrients a day from roughage including 9 pounds of hay and 25 pounds of silage or equivalent in pasture.

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Bender said they could have consumed 14 pounds of hay and 30 pounds of silage and thereby saved 5 pounds of grain a day—a reduction in grain feeding of 46%.

Because the cows harvest it themselves, good abundant pasture costs less than winter roughage. It stimulates milk production, fattens dry cows and grows yearlings in fine shape. To get maximum results throughout New Jersey's 180-day pasture season, Professor Bender claims that the dairymen must do something to get desirable abundant pastures.

"Roughage will produce 70% of the milk if it's of good quality and fed liberally. Lots of fertilizer must be used. We use 200 pounds of nitrogen or 400 pounds of 10-10-10 on permanent pasture, which not only helps extend the grazing to mid-July but brings the pasture back faster in September."

Bender advocates rotation grazing management, mowing to remove seed heads on some grasses, and June mowing to keep grasses in a more vegetative state. He says care should be taken to avoid overgrazing alfalfa, and he has found that a well-fertilized field of Sudan grass often answers the mid-summer grazing problem from mid-July through September.

Cow Clipping Pays in Clean Milk

In an experiment conducted by the Bureau of Dairy Industry (See Farmers Bulletin 602) it was found that fresh milk from dirty cows had an average bacterial count of 55,208 per cubic centimeter. Fresh milk from clean cows with udders and teats washed averaged only 4,947 per cubic centimeter. (A cubic centimeter is about 16 drops.)

"When the cows are in stables, clean them thoroughly at least once a day," says the U.S.D.A. "Clip the long hairs from their udders, flanks, and tails in order that dirt may not cling to them."

The body of the cow, especially those parts of the belly, flanks, and udder that are immediately above the milk pail, may be the source of bacterial contamination. Clipping these parts makes it easier to clean the cow and keep manure, loose hair, bedding, and other foreign matter from falling into the milk pail.

Successful Farming

Water for Thirsty Vegetables

Condensed from New England Homestead

Paul W. Dempsey

A FAIRLY constant supply of water is necessary for normal productive growth of vegetable crops. The lack of a steady supply of water undoubtedly causes more loss in quality and quantity of vegetables than all other sources of trouble combined. As this most important element is seldom available throughout the growing season an irrigation system is essential equipment for the vegetable grower. Every year there are one or more periods of two to five weeks without rain. To have water available at these times may make the difference between a profit or loss.

The actual value of an irrigation system will not only vary from farm to farm but will also vary from year to year on one farm. Because of the large investment required and the comparatively few times the equipment may be absolutely necessary some seasons, many growers keep putting off its purchase. This is so in spite of the fact that some of these same growers know that they might have paid for the equipment with the profits from one season's use.

If a grower hopes to get his crops to market by a certain date his hands are tied if nature does not supply the necessary water. After sowing seed and setting plants water is essential to get them off to a good start. Vegetables must be kept growing; a check in growth due to lack of water is bound to result in lower yields and poorer quality. Water also makes possible more intensive cropping and quicker results from fertilizer. An irrigation system is the only insurance against drouth.

The required equipment and its installation will vary on every farm. A grower considering the purchase of an irrigation system should consult other growers who have installed equipment under somewhat similar conditions and then approach salesmen for costs and plans.

Some growers will want to try out a few lines for a year or two. This is a good way to gain more definite information on the many factors that must be taken into consideration before spending large sums of money for a permanent installation. On the other hand a grower who equips his

Reprinted by permission from New England Homestead, Springfield, Mass., November 8, 1947

whole farm at once will immediately be prepared for whatever weather may come.

For years, most irrigation systems were operated from town or city mains. This automatically took care of two of the most serious problems facing the grower—a good supply of water and a constant pressure. Recently the trend has been the other way and growers now find it best to provide their own source of water and the necessary pumping equipment.

Centrifugal pumps are used by most growers today and they are operated by both electric motors and gasoline engines. Self priming pumps are now available and as they will save a lot of trouble, should be specified wherever possible.

The size and length of the mains and supply lines will have considerable effect on the cost of upkeep of an irrigation system. It is important to provide the required amount of water at the right pressure throughout the system without the use of unusually high pressure at the pump, as may be necessary, when the pipes are too small, or extra size pipe if an undersized pump is used. In other words, the whole system must be planned as a unit for economical operation. Manufacturers of nozzles, pipe and pumps are only too glad to be of assistance. Or, your County Agent should be able to direct you to a source of information.

The area to be watered at one time, the distance and the elevation from the pump and the pressure needed to operate the nozzles all determine the size of the pump and pipe.

For years the overhead sprinkler pipe or so-called "Skinner" system has been used successfully by New England growers. In this system ordinary galvanized iron pipe is drilled 5/16") and tapped (24 threads to the inch) for a small brass nozzle every three ft. Tiny streams of water (12 gallons per hour) come from these nozzles (all makes throw about the same stream) perpendicular to the pipe and paralled to each other for a distance of about 25 ft. at a pressure of 20 lbs. or over. A vertical pipe called a "riser' or, in many installations today particularly where the lines are portable, a rubber hose, connects the nozzle line to the supply line. Automatic oscillators are available to turn the lines by water power. Without these watering is likely to be uneven.

The nozzle lines should be parallel to the rows and be large enough to supply 40 pounds pressure at the last nozzle. At this pressure each 100 ft. of line will apply about 7 gallons of water per minute or about an inch of

water to an area 100 by 50 ft. in 8 hours.

A few growers have a sufficient number of lines to cover their whole acreage. These are left in place, usually supported by iron or wooden posts 2 to 6 ft. high, except when the land is being plowed, harrowed and planted when they are removed and placed to one sire. Other growers have portable lines which are moved from field to field as needed. Naturally, the more a line is moved the shorter its life will be.

Advantages of the "Skinner" type of irrigation:

The water falls in a fine spray. Does not pack soil or bruise foliage. No erosion of soil.

Even watering is assured by uniform distribution at a rate which does not exceed the absorbtive capacity of the soil.

Uneven land and fields with different types of soil can be watered without difficulty.

Equipment made by various companies is interchangeable.

Parts can be purchased and lines made up by grower at little expense.

Disadvantages:

Ready-made equipment is expensive.

Pipes and other parts are "tender" and will not stand rough handling of the average farm laborer.

The light spray is affected by the least breeze.

Considerable loss from evaporation on a hot, windy day.

The application of water is slow, making it necessary to have more equipment to cover a given area in a given time.

Without automatic oscillators, lines must be turned at regular intervals or water will be very uneven.

Keeping plant foliage wet for a long period is more conducive to disease.

During the past 12 years an irrigation system using wide-radius revolving sprinklers in connection with lightweight welded pipe has come into extensive use throughout the United States. The method was slow to be adopted by New England growers, but once they saw its advantages a great number of both small and large installations have been made. The lines from pump to sprinklers consist of lightweight steel welded pipes from 3 to 8 inches in diameter. These are laid on top of the ground. Each section of the sprinkler line is about 20 feet long and has a threaded outlet for attaching a ¾" or 1" "riser" to hold the sprinkler. In the average installation every other outlet is used making the sprinkler heads about 40 ft. apart. "Risers" may be from 1 to 6 ft. high.

The ends of each section of

pipe come equipped with undetachable couplings which can be connected or disconnected without tools. An ingenious soft rubber washer fits in one end which is so made that the higher the pressure the tighter joint it makes, preventing leakage and at the same time allowing considerable play at the joints. This makes it possible to use the lines on slightly rolling land.

Double nozzle sprinklers are used—one covering the outer area of the circle while the other waters the inert section. Sprinklers of all sizes are available, from one discharging as little as 5 gallons per minute to a giant head capable of putting out over 200 gallons per minute covering a circle over 300 ft. in diameter.

Advantages of the lightweight pipe system:

Readily carried and quickly connected.

Applies water quickly—average line applies 1 inch in 2 hours or 4 times as fast as "Skinner" system.

With proper pressure and size of nozzle, drops are well broken up.

Requires no posts.

Takes no labor to operate after water is turned on.

Nozzle comparatively large, so will take dirty water.

One man can operate and cover large areas in few hours.

Disadvantages:

Equipment is expensive, particularly for the small grower.

Water spray comparatively coarse. In order to throw water any distance and apply it fast, drops must be coarse. This means packing of soil with formation of crust on some types of soil. It may also cause some damage to small seedlings or tender crops if proper pressure is not used to break up drops.

Men changing pipe find soil soggy and sink 3 to 6 inches. Water is applied so fast it is not absorbed by some kinds of soils. In general, a line should not be moved within an hour after turning off water—any more than you would go on a field directly after a heavy rain. Therefore it is best to use two or more lines at a time, changing one while the other is operating.

On slopes and certain types of soil there may be some washing of the soil.

Every vegetable grower needs an irrigation system.

The vegetable grower is at the mercy of so many uncontrollable conditions that every one he can get under his control takes that much more out of the element of chance. Vegetables are 90% plus water. The good grower will have a supply at hand when it is needed.

Stop Gullies . . . the Easy Way

Condensed from Farm Journal

J. Gilbert Hill

NATURE can't heal gullies, alone. But given just a little medicine with a plow, mowing machine, and hay rake, she will recover millions of acres of "worthless," often abandoned land, for production of food—and profits.

If a major operation is required, the tools are a few old fence posts, brush, cornstalks, cans,, or other troublesome junk about the place. They're actually better—and much less expensive—than bulldozers and road graders.

These are lessons learned by research at the Red Plains Soil Conservation Experiment Station near Guthrie, Okla., where the SCS and Oklahoma A. & M. College have the oldest U. S. soil study experiments.

The station is located purposely in an area of steep slopes, covered by a red, sugary clay and sand soil which melts in a shower, and chases itself downhill with every decent rain.

Land much like it all through the South was plowed and produced millions of bales of cotton. Then it was abandoned to gullies, weeds, and briars.

Harley A. Daniel, station director at Guthrie; Harry M. Elwell,agronomist; and Maurice B. Cox, agricultural engineer, had enough gullies to try everything. They did.

They built a terrace about 50 yards above the source of one gully to keep most of the water out of it. They planted the field around it to native grass. They fenced it off from livestock, and just left it alone for 17 years. It's just as deep as it ever was.

Every time grass, or weeds start in the poor soil in the gully bottom the banks "sluff off," or cave in to cover it up and kill it. The next rain washes the loose soil down, and the gully gets wider and deeper.

The engineers built rock and mortar dams, hoping the gullies would silt full behind them. They did. But every dam caused a water-fall which made the gully deeper below the dam.

Often there wasn't enough top soil left on the soft sandstone to work with bulldozers and terracing machines. It was far too expensive anyway—based on the brightest hopes of economic return.

Reprinted by permission from the Farm Journal, Philadelphia, Pa., November, 1947

Finally they hit upon *the plan.* They "rounded off the banks of the gullies by plowing, throwing the soil into the gully. Gullies were "flattened out," the rushing water was spread over a wider area, and slowed in speed.

Then they tested the soil and applied commercial fertilizers, mostly phosphate and lime. Summer and winter-growing legumes were seeded. Finally the whole thing was *covered up with hay.*

The hay usually comes right off the same field. They wait until the native grass around the gullies is mature. Then they cut it with a mowing machine, rake it over the freshly plowed gully, and spread it evenly two to five inches thick. This stops washing, and protects the grass seedling.

In the deepest washes they piled brush, cans, corn stalks, anything that would "choke up" a gully and slow the water down. In some places, low fence posts were set, with a little brush and a lot of hay piled in behind them. When water slows down it drops its mud, right where most needed.

After the first year careful grazing can start. But to give the plants a chance to set roots and make seed, it may be necessary to "hay over" a few of the worst spots, the second and third years.

The speed with which the reclaimed land can be used depends, of course, on how bad the gullies are, and how fertile the soil is around them. Last year the station made 43 pounds of beef an acre grazing steers on land where they would have starved five years ago.

"These hills are not worthless," says Daniel, "but they do need management. It won't take a lot of money to save a farm, or build one. It will take a little more land to make a living. But there's a fertile valley at the bottom of every one of these slopes, where good crops will grow, if not smothered by mud.

"Pastures, perhaps some meadow land for hay on the slopes, crops in the valley for feed and cash, a beef ranch or a dairy, a few chickens and a few pigs—a good living and happiness for a farm family—it's all possible right here."

Actually, when hot dry weather comes the best feed, the greenest grass, now grows in strips down the hills at the bottom of the gullies. There's more moisture there. And hay used the easy way, holds, and builds fertility.

Why Prove Herd Sires?

Condensed from The Shorthorn World

Joseph Muir

Washington State College

It takes work to prove beef bulls. Only the stout-hearted, determined breeders have come through and proved their favored bloodlines superior as meat producers. In order to prove definitely the value or demerit of a bull or of given bloodlines, several factors have to be considered. These include feed-lot efficiency, grade, carcass, conformation and quality, dressing percentage, weight at birth, weaning weight and age, and the uniformity of the offspring in these various points. If beef cattle breeds are going to progress they must plan a program of proving beef bloodlines and undertake the intensive work required for such a program.

The question often is asked, "Why prove beef bulls?" Is not the showing record or the eye-judgment good enough to determine the type, conformation and quality of beef animals? Let us go back and review briefly before answering this question.

In the early development of the British breed, when Cruickshank, Bates and other breeders in Scotland and England were developing the Shorthorn, much time was spent to determine the feed lot efficiency or deficiency of the then existing strains of cattle, and out of their intensive hard work came our present-day, improved beef stock.

Early in the nineteenth century breeders began bringing their animals together for display at local fairs. From this early beginning the showring and the big stock shows displaced more or less the feed lot as a means of evaluation, so that today values of breeding animals often are based almost entirely on their showring record or the showring record of ancestors.

To the serious student of animal husbandry the inadequacy of the showring standard is realized. Consequently many purebred breeders and experiment stations have undertaken studies to determine methods of appraisal of breeding animals based on progeny tests and considering economically important factors such as rate and efficiency of gain and carcass quality.

Reprinted by permission from The Shorthorn World, Aurora, Ill., October 10, 1947

To date the methods of evaluating or proving these animals for beef production are not the last word but do show the way, and have opened up fields toward further improving methods to prove beef bulls.

Using the showring standard solely, great advancement has been made in the beef cattle breeds. Through selection from eye judgment, purebred breeders have improved the beef producing qualities of their animals. Perhaps this has been more along lines of good type and conformation than of efficiency in the utilization of feed. The theory has been to develop a blocky type animal as the most efficient beef producer.

It still remains to be proven which bloodline will do the job best. With the highly specialized stock shows of the present day testing of beef cattle for efficiency of production has been largely cast aside and has been replaced by the faith in judges of livestock to see in the animal the most efficient producer without actually testing for these characteristics.

It is entirely within reason that the purebred breeders can produce the desired type of beef animal and still test the efficiency of these animals by certain production standards that they must meet.

The present day methods of approaching livestock improvement include bull grading, performance testing, showring classification, and feed lot observation. The term "bull grading" doesn't sound very scientific nor does it smack of the romantic appeal that has surrounded the cattle industry, yet its adoption in the Western states is doing more to improve range beef cattle than any other one recommended practice in the beef cattle business. The idea developed perhaps twenty years ago when the program to eliminate the scrubs was popular. Out of this came some definite standards and measures by which to grade an animal. This bull grading became an important step in the selection of bulls for Western ranges.

Bull grading has been found to be the first step in a sound range livestock improvement program. Early steps taken were to pass laws to limit the use of bulls on ranges to registered animals of the recognized beef breeds. Next came selection committees to pass on the quality of bull to go onto the range. Out of this came standards of bull grading which have been adopted and have been in operation generally since.

After grading had been used for a few years stockmen became grade conscious. They began to select bulls from the better known breeders where A and B grade bulls could be found.

The purebred breeder who has had easy picking selling inferior or C and D grade bulls now begins to find that his bull market is vanishing. Consequently it will not take long for this type of purebred breeder either to go out of business or to revamp his own breeding program.

Under the grading method the grade standards adopted are A, B, C, and D. A grade A bull is excellent for breed characteristics, size, constitution and vigor, type, conformation, and quality. The grade A bull is considered good enough to head a purebred herd. The grade B bull is good individually as to breed character, is vigorous and husky, has plenty of bone and natural fleshing and has a good back, head and legs. This grade is the kind range and commercial producers like. Their calves bring top prices because they have the qualities necessary through eye judgment, at least for efficient feed utilization. C grade bulls are borderliners. They are lacking in beef type and conformation, may be light boned, shallow bodied, poor headed, lack masculinity, and be cheap and plain in style and type. Usually these are the tail end of an inferior purebred herd. A grade D bull is a plain scrub, usually of questionable breeding, poor type, shallow bodied, narrow, rough, leggy, and stunted.

Even though error is made occasionally as to the grade given an animal, the grading system is pointing the way toward rapid improvement in beef type and quality in the Western states, particularly Utah, Idaho, Washington and California. The past three years two thousand bulls have been graded in Washington and it has been interesting to note the improvement in various localities the second time around on inspection tours. In practically every instance the C and D grade bulls have disappeared and have been replaced by A and B grade individuals.

Still there is lacking conclusive and definite proof of the real value of those animals in producing superior steers for the feed lot. The next step, and the important one, for purebred breeders is that of developing a method of performance testing of beef cattle. At the present time the Bureau of Animal Industry at the Miles City Experiment Station has developed a method of testing beef cattle on the basis of performance. Under this plan all calves are started on the test at 500 pounds and fed to 900 pounds.

Neither the time spent in gaining the 400 pounds nor the age of the calf when the test began are considered. A minimum of five steer calves from each bull is used. The test is begun shortly after weaning time and the calves

weaned at the same weight regardless of age. Each calf is fed in individual self-feeders to check the amount of feed consumed. Each is allowed to eat all it wants. Only calves from purebred dams of the same breed as the bull are used.

In this experiment calves from two bulls of prize winning ancestry were tested. The results showed the cost of the 400 pounds gained on calves of one sire was $31.66 a calf less than on calves by the other sire. This shows how the record of performance test may eliminate some sires with blue ribbon ancestry.

In the performance testing program developed at Miles City the following factors were considered. Weaning weight, gain in feed lot, final weight, per cent of bloat, carcass grade, sale price of 100 pounds, average gross return from each steer.

Before the test these bulls were graded by eye judgment as to which was the most desirable to use. The bull thought to be best in type and conformity proved the third most efficient bull from the study of his steers. This performance testing experiment proved one cannot tell always by looking at a bull just how desirable his calves will be, even though belief is common to the contrary.

The Miles City Station made the following recommendations for carrying on record-of-performance work: "That from birth to weaning all calves of any one herd will be fed alike within reasonable limits as far as possible without extra expense. Females that do not produce enough milk to feed their own calves will be culled. No male calf, the dam of which does not give sufficient milk for his development, will be saved for breeding purposes. Young stock will be handled similarly as to housing and grazing. Young stock will be scored at a standard age or weight depending upon the environmental conditions under which the animals are raised. The final evaluation of the calves will be based on gain during the nursing period, gain during the feeding period, the feed required for 100 pounds of gain, and the score at the end of test. The evaluation of the female will be used on her calves' performance and the evaluation of the sire will be based largely upon his calves' performance, in gain during the feeding period after weaning and the feed consumed for each 100 pounds gained."

This program has the attention of progressive livestock breeders. It may point toward a way of proving beef bulls as accurate as that which the dairy industry has at its command in proving dairy bulls through the butter fat test.

It takes something besides breeding to prove a bull. Health and vigor perhaps are equally important in a range production program. First of all a bull should have the proper genetic background. Then, he should be fed properly so that he can demonstrate his conformation and breeding ability. For example, if a stockman should buy a bull calf from a good herd and proceed to half-starve the calf and over-work him as a yearling, the bull may be stunted permanently and will look like an inferior animal always. Usually, then it is that the good breeder loses a customer.

Breeding animals need enough feed to bring out genetic type and conformation inherent in them. It is true that a stunted bull may produce just as good calves as if he had been properly finished but the doubt remains as to whether the bull ever would have developed the right conformation.

Most stockmen want to breed as many cows as possible in order to utilize the bull to the fullest extent. Thus, the matter of proper management of the bull is highly important. In the various range states twenty-five to forty cows usually are permitted for each bull on open range. Even if the law permits only one bull for each twenty-five cows, there remains the matter of management if all are to be bred during a set breeding season. The bulls must be distributed properly among the cows so they will not congregate in uneven ratio of bulls to cows.

It is not unusual to find several bulls on meadows and near water holes during the summer and many groups of cows a mile or two away. There is need for good riders to help arrange distribution.

Before bulls go on the range they need special feeding so they will go out with plenty of strength and vigor and fertility. Quite often bulls that are extremely thin in flesh in the spring will be sterile before the breeding season is advanced very far and will take most of the summer in regaining their vitality. As a result, too often cows are coming in off the range in the fall, still unbred.

Under the farm and pasture condition it is equally as important to manage the bull for the best breeding results. The popular trend today is to breed the cow herd during a relatively short period—May 1st to July 1st. This brings the calves in a relatively narrow season. Then the cows can be observed more closely and calves are uniform in weight at weaning time. With this program, bulls can be conditioned at the proper time and watched closely in the pasture. Many small herds now are practicing hand breeding.

Usually at least one or two crops of calves are required to determine the potence of the bull in the transmission of characteristics. A bull that has sired two or three calf crops of the right type and that are uniform regardless of the cows is the one that should be kept. Animals with unsatisfactory breeding records should not be tolerated in the herd, no matter how good their individuality nor how fashionable their pedigrees. Bulls that have demonstrated their ability to produce offspring of a high order of merit should be kept as long as they continue to breed although they themselves are sadly lacking from the standpoint of showring excellence. Sometimes such defects can be laid to advanced age, disease, abuse or neglect while bulls were still calves.

Purebred breeders who are discerning in their breeding program will look for a bull that they want to do certain things in their herd. For example, they may have large cows of good body conformation yet rough and heavy boned. Their interest then may be in procuring a bull of extreme smoothness and somewhat lighter bone in order to balance out the large size and roughness of the cows. It is here that pedigrees are of especial value. Certain bloodlines have been found to transmit distinct characteristics. Thus by a study of bloodlines and their characteristics it is possible to fuse breeding to get the desired results. However,, in buying a bull to correct faults do not get one that will fail to maintain the present superiority of females in other points.

Commercial cattlemen usually make the mistake of purchasing bulls too young. And the purebred breeder makes the mistake of selling bull calves before they are well grown out. This works to the disadvantage of both as the purebred breeder may lose customers if the bull appears stunted after the first year's service and the commercial cattleman does not get enough use from the bull. An under-aged bull may not breed enough cows during the first year he is in the herd. It is not advisable to use a bull under eighteen months old. By that time the breeder should have the bull fairly well grown out. Two years is a more desirable age for a bull to go into a breeding herd.

It is unfortunate that more trading of good proven bulls is not done. Many times a small breeder owns but one bull and will not retain him for more than three years, as by that time his daughters are of breeding age, This bull may have proven to sire top qualities and would still be of serviceable age up to seven or eight years old. A mature bull will require much less grain and care than a yearling or two-year-

old and can be purchased on his breeding record. All too often good sires go to the stockyards before they have been used to the fullest extent.

Beef cattle are bred and produced for one main purpose, pounds of meat. With the exception, possibly of extreme fanciers, beef cattle production cannot be justified on any other basis. There is need for consistently improving the ability of beef cattle to produce beef efficiently and economically. Animal husbandry practice advanced rapidly in the field of nutrition, and progress through breeding has been outstanding in the past one hundred years. The problem still remains however, of bringing together feed plus breeding, and by efficient methods to prove difinitely bloodlines and individual sires.

To Save Baby Pigs

In the wake of the disastrous losses of baby pigs last spring, the American Foundation for Animal Health has announced a new drive to save more pigs.

A million extra pigs, to help relieve the pork shortage and compensate for spring losses, was the announced goal of the campaign—and every farmer in the country was urged to do his part.

Steps to assure healthier litters and a higher rate of survival are:

Provide clean ground and clean, dry shelters for sows and pigs.

Feed brood sows a balanced ration ahead of farrowing time and during the nursing period. The ration should provide plenty of animal proteins, vitamins, and minerals—including alfalfa.

Keep the sows comfortable and clean, free from lice and mites; but force them to exercise during gestation period.

Have the farrowing pens properly constructed; if the weather is chilly, provide brooder pens for the pigs.

Prevent influenza losses by avoiding overcrowding and dusty floors, and providing proper ventilation without drafts.

Feed clean soil to pigs for the first three weeks, to guard against anemia or thumps; feed a good, balanced ration from 10 days on.

—*Dakota Farmer*

Grass for Mid-Summer Use

Condensed from Pennsylvania Farmer

Franklin P. Ferguson

UNTIL recent years nearly every one ignored problems of grass culture, although grass has great usefulness if grown economically. Grass has been traditionally considered a gift of nature and many farmers still think of it so.

Attempts now are under way at such institutions as the Penna. Agricultural Experiment Station and the U. S. Regional Pasture Research Laboratory at State College to breed better strains of grasses and legumes, also to fertilize and manage them in such a way as to result in more productive pastures and haylands. Preliminary results are so encouraging that plans are under way to redouble these efforts.

Over four million acres of land are grazed in Pennsylvania. This compares with about 6½ million in harvested crops. Practically every farmer in the state is interested in grass. The Pennsylvania Association of Cooperative Organizations is providing college graduate assistance in grass production research beginning this year.

Farmers in Pennsylvania commonly have more grass than they can use in June. But in August, dairy men in particular often are forced to supplement pastures with grain, silage or hay or to allow their cows to decline in milk flow. Other farmers suffer in a similar way, but the effect on their incomes is not so immediately apparent.

Grass seedings can be made to produce forage in liberal amounts in mid-summer, but pastures and meadows of this kind require as much attention as other crops. Production of ample grass in warm weather usually means tillage, fertilization and reseeding of a considerable area of permanent sod or former crop land. Plentiful mid-summer grazing is much more likely to be assured if in addition to permanent pasture the aftermath from fields harvested for hay or silage is used. No easy way has been discovered as yet, however, of keeping high producing legumes in production for more than three or four years.

Bluegrass and white clover, the prevailing types found in most permanent pastures, persist largely because they can survive close and continuous grazing. Bluegrass produces largely in the cool parts of the growing season, while

Reprinted by permission from Pennsylvania Farmer, Pittsburgh, Pa., June, 1947

white clover may make very little growth unless summer rainfall is ample and well retained.

Lime and superphosphate have been found to encourage a bluegrass-white clover sod to restore itself, but it results mainly in better grazing in spring and fall. Nitrogen also has been found to increase growth of bluegrass, but only at a time when grass already is plentiful unless heavy applications are made in mid-summer and summer rainfall is sufficient.

In providing pasture for the College dairy herd in recent years, most of the problems of grass production have been encountered. In 1940 plans were made to improve an abandoned "barrens" field which was so poor as to support only a few weeds. In 1942, eight loads per acre of stable manure, each fortified with ground limestone and superphosphate, were applied. The next season a similar amount of chicken manure per acre was added. No reseeding was done, but bluegrass and redtop developed so rapidly that the better parts of the field had to be clipped that year.

Although a good sod had been produced by liming and fertilizing the soil, additional grazing was not forthcoming at a time when it was most needed. Accordingly this sod was torn up but not completely destroyed with a bush and bog harrow (heavy cut-away disk). In 1944 the area was seeded to Ladino clover at the rate of one pound per acre. Bluegrass came in strongly in spite of having been disked and a good crop of hay was harvested in 1945.

On July 1, 1946, this "worthless" field was found to be producing over a ton of air-dry forage per acre in addition to material which was being grazed. Although the cost of converting this piece of waste land into productive pasture has been large, staff members in the Department of Dairy Husbandry are so pleased with the results that an adjoining abandoned area has been cleared, fertilized and seeded. While costs of renovating grasslands are high, returns from forage in terms of milk produced are also large.

Land which already bears a sod usually has to be tilled to some extent before improved grasses will catch. The best time for tearing up old sods is midsummer, experiments show, and fairly complete destruction of the grass is desirable. This may be accomplished with a plow, but plowing may allow erosion the following winter on hillsides. Subsoil also may be brought to the surface with a plow in such quantities as to increase the difficulty in getting grass to catch. Fairly heavy applications of mineral fertilizer usually are neces-

sary for highly productive forage crops, and the addition of a coating of manure seems to aid in giving grass seeding a good start.

Thousands of strains of grasses and legumes are being tested at Pasture Laboratory. The best of these are being tried out for usefulness in combination seedings. In general, a grass and a legume growing together will produce more forage than either growing alone, since the legume will supply nitrogen throughout the summer for the use of the grass. The best combinations are turned over to workers at agricultural experiment stations in the Northeast for use under those conditions to which the forage plants are particularly suited. About a dozen full-fledged pasture and forage crop production trials are under way at the Pennsylvania Experiment Station and several others are being conducted in various parts of the state.

The Story of Vanilla

The story of vanilla begins with the discovery of America. The richness of this new land lured men across the Atlantic to claim country and wealth for the different motherlands.

It was on one of these trips that Cortez landed in Mexico, and eventually reached the mightiest monument of the Aztecs—the Hall of Montezuma. Montezuma, in his hospitality, offered Cortez his favorite potation, "chocolatl," a rich, heavy drink of exotic sweetness.

Cortez remembered "chocolatl," but could not discover its secret flavoring. Upon his return to Spain, he could only expound on the glories of that new drink. Fifty years later another expedition was successful in obtaining the secret. Francisco Hernandez, leader of the new expedition, named the new luxury flavor, "Vanilla," which translated means "small pod."

Mexico continued to be the source of supply for many years, and fortunes were made in trade in this new world product. But others craved the product, and set about to try to transplant it to regions accessible to them.

Cuttings of the vines from which vanilla beans are obtained, were transplanted first on the island of Java; then to Bourbon Island (now Reunion Island) Madagascar, the Comores and Tahiti.

Production was carefully watched, markets built up, and trade expanded so that these islands—especially Reunion and Madagascar now furnish the major part of the world's supply. Yet Mexican vanilla is rated most delicate in flavor, and commands a higher price.

Dr. George Washington Carver

1864 — 1943

and the George Washington Carver Foundation

George Washington Carver, the pioneer of agricultural research who became the "First and foremost Chemurgist," was born, of slave parents, on a farm near Diamond Grove, Missouri, on or about July 12, 1864. In his infancy he lost his father, and he and his mother were kidnapped and carried off into Arkansas. He was bought from his captors for a race horse valued at $300 and returned to the Carver plantation in Missouri, but his mother was never heard of again.

Dr. Carver received his early training in a small, one-room school at Neosho, Missouri, some eight miles from the Carver plantation. After completing this school he worked and attended other schools where and when he could, finally completing high school at Minneapolis, Kansas. During this period he became a member of the Presbyterian church and this remained his denomination throughout his life. Dr. Carver was never married.

In 1890 George Carver entered Simpson College in Iowa and the next year transferred to Iowa State College from which he graduated in 1894. He supported himself by working, and his diligence both in and out of the classroom, won him the appointment of Assistant Station Botanist at the college. He continued his studies and received his M.S. degree in 1896. He was then placed in charge of the greenhouse, and devoted himself to bacterial laboratory work.

During the year 1896 Dr. Carver was invited by Booker T. Washington to join the faculty at Tuskegee Institute, as Director of Agriculture. He accepted the offer and began his work at Tuskegee Institute, October 8, 1896. Dr. Carver organized the Agricultural Department at Tuskegee, planned the erection of the first building to be devoted entirely to agriculture, while he taught classes in science and agriculture and conducted his research work. At its 1896 meeting the Alabama State Legislature created the Tuskegee Agricultural Research and Experiment Station and Dr. Car-

ver was also made its Director. These two positions he held until his death. His outstanding work in agricultural and chemical research are well known to scientists and laymen alike.

George Washington Carver died January 5, 1943. His entire estate amounting to over $60,000 was bequeathed to the George Washington Carver Foundation, and has been used as the beginning of an endowment fund for the Foundation.

"We look forward to the day when the South will fully realize what a vast storehouse of wealth it has in its native plants, and capital will be turned into their manufacture."

—George Washington Carver

FOR THE FARMER'S LIBRARY

These books are recommended as outstanding in their field:

Animal Sanitation and Disease Control—By Dr. R. R. Dykstra, Dean, School of Veterinary Medicine, Kansas State College. The Interstate Printers and Publishers. $3.50.

A Living from Bees—By Frank C. Pellett, Field Editor of American Bee Journal. Orange Judd Publishing Co., Inc. $2.25.

Beef Cattle Production in the South—By D. W. Williams, Head, Department of Animal Husbandry, A & M College of Texas, College Station, Texas. The Interstate Printers & Publishers. $2.50.

Breeds of Livestock in America—By Henry W. Vaughan, formerly Prof. of Animal Husbandry, Iowa State College. College Book Co. $4.75.

Dairy Cattle Feeding and Management—3rd Edition—By H. O. Henderson, Prof. of Dairy Husbandry, W. Va. Univ., Carl W. Larson and Fred S. Putney. John Wiley & Sons, Inc. $4.50.

Dairy Science—By W. E. Petersen, Ph.D., Assoc. Prof. Dairy Husbandry, Univ. of Minn. By R. W. Gregory. J. B. Lippincott Co. $4.50.

Diseases and Parasites of Poultry—By Edgar Hugh Barger, D. V. M., Berkeley, Calif., and L. E. Card, Ph.D., Prof. of Poultry Husbandry, Univ. of Illinois. Lea & Febiger. 3rd Edition. $3.75

Domestic Geese and Ducks — By Paul P. Ives, Pres. Am. Waterfowl Ass'n. Orange Judd Publishing Co., Inc. $3.50.

Elements of Soil Conservation — By Hugh Hammond Bennett, Chief, Soil Conservation Service, U. S. Dept. Agri. McGraw-Hill Book Co., Inc. $3.20.

Farm Management—By Robert R. Hudelson. The Macmillan Co. $2.50.

Farm Records—By John A .Hopkins, Ph.D., Asso. Prof. Economics, Iowa State College. Iowa State College Press. $3.00.

Farm Management Manual—V. B. Hart, S. W. Warren, Ivan R. Bierly—N. Y. State College of Agri. Comstock Publishing Co. $1.00.

Feeds and Feeding—By F. B. Morrison, Prof. of Animal Husbandry and Animal Nutrition, Cornell Univ.. Morrison Press. $6.00.

Forestry in Farm Management—By R. H. Westveld and Ralph H. Peck. John Wiley & Sons, Inc. $3.50.

Grow Your Own Fruit—By M. G. Kains, formerly U. S. Dept. of Agri.; Prof. of Horticulture, Penna. State College, Greenberg, Publisher. $3.50.

Hatchery Management — By Roland C. Hartman, Editor, Everybody's Poultry Magazine, and G. S. Vickers, Field Mgr., Ohio Poultry Improvement Asso. Orange Judd Publishing Co., Inc. $4.00.

How to Raise Rabbits for Food and Fur—By Frank G. Ashbrook, Fish and Wildlife Service, U. S. Dept. of the Interior. Orange Judd Publishing Co., Inc. $2.00.

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Judging Dairy Cattle—By Edwin S. Harrison, Professor of Animal Husbandry, Cornell University. John Wiley and Sons, Inc. $3.00.

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Repairing Farm Machinery—By Ivan G. Morrison, Asst. Professor Agri. Education, Purdue Univ. The Interstate Printers & Publishers. $2.25.

Weeds of Lawn and Garden—By John M. Fogg, Jr., Prof. of Botany, University of Pennsylvania. Univ. of Penn. Press. $2.50.

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INDEX

Beef Cattle

Livestock Production ..... Feb., 1947
Heredity and Prepotency ..... Feb., 1947
Beef Cattle ..... April, 1947
When is a Breed? ..... May, 1947
How Much Will He Weigh? ..... June, 1947
Proper Livestock Feeding ..... June, 1947
Problems of Livestock Producers ..... July, 1947
Osage Cattle Kingdom ..... Aug.-Sept., 1947
Correcting Herd Faults ..... Nov., 1947
Creep Feeding for Calves ..... Nov., 1947
Reducing Feed Costs ..... Dec., 1947
How Fat Shall Cattle Be? ..... Jan., 1948
Nutritional Diseases in Beef Cattle Jan., 1948

Conservation

St. Joseph Helps the Farmer ..... Feb., 1947
Land Use and Conservation ..... May, 1947
Fish Farming Pays Dividends ..... May, 1947
Blue Lupine in the Southeast ..... June, 1947
1000 Acres Back to Work ..... July, 1947
Greece Looks Ahead ..... July, 1947
Restoring Grass to Idle Lands ..... Oct., 1947
Trashy Mulch Methods Recover Tired Land, Oct., 1947
Living Fences ..... Oct., 1947
Don't Give Up on Grass ..... Nov., 1947
20 Acres ..... Jan., 1948

Crops

Calves Solve a Problem ..... Mar., 1947
Rose Farmers ..... Mar., 1947
Crops ..... April, 1947
Successful Seeding Tricks ..... April, 1947
A Better Sudan ..... April, 1947
Australian Subterranean Clover ..... April, 1947
Rich Fog in the Hollows ..... May, 1947
200 Bushels of Ear Corn Per Acre ..... May, 1947
Rust: Shifty, Costly Wheat Enemy ..... June, 1947
Major Elements in Plant Nutrition ..... June, 1947
Experience with Ladino Clover ..... June, 1947
New Clovers and Alfalfas ..... Aug.-Sept., 1947
Hot Hay ..... Aug.-Sept., 1947
Does It Pay to Cultivate? ..... Oct., 1947
New Grasses for Old ..... Oct., 1947
Brome Must Have Good Management, Oct., 1947
Combines vs. Clover ..... Nov., 1947
Broomsedge Land Yields Well ..... Dec., 1947
Twenty-six Years of Diversified Farming, Dec., 1947
Peace from Grass ..... Dec., 1947
No More Corn Plowing ..... Jan., 1948

Dairy Cattle

Cooling Milk for Keeping Quality ..... Dec., 1946
What's Skimmilk Worth ..... Dec., 1946
Dairy Calves Need Good Feed and Care, Jan., 1947
Reducing Cost of Milk Production ..... Jan., 1947
What It Takes to Feed a Cow ..... Jan., 1947
Practical Feeding for Milk Production, Feb., 1947
Calves Solve a Problem ..... Mar., 1947
Selecting Your Herd Sire ..... Mar., 1947
"Mail Order" Breeding ..... April, 1947
Why Stoop to Milk? ..... May, 1947
World's Cheapest Hired Hand ..... May, 1947
Ensilage Feeding Without Work ..... May, 1947
The Romance of the Gut ..... June, 1947
Radiant Heat in the Dairy Barn ..... June, 1947
An Old Fiber with a Future ..... July, 1947
No Fork on This Farm ..... July, 1947
One Man Silo Filling ..... July, 1947
Roughage for Dairy Cattle ..... Aug.-Sept., 1947
What Does It Cost To Get a Cow with Calf? Oct., 1947
Care of Calves Important ..... Oct., 1947
10,000 Sons and Daughters ..... Oct., 1947
Champions Require Good Feeding ..... Nov., 1947
One-Man Milking Plant ..... Nov., 1947
How to Select Young Bulls and Heifers, Dec., 1947
Raising Dairy Calves the Modern Way, Dec., 1947
The Pen Type Cow Stable ..... Jan., 1948
Winter Grazing in the South ..... Jan., 1948

Farm Machinery

Farm-Size Crop Driers ..... Jan., 1947
Air-Minded Farmers ..... Jan., 1947
New Weapons to Stop Rust ..... April, 1947
Operation of the Barn Hay-Drier ..... June, 1947
A Hired Man or More Machinery? ..... June, 1947
Cooling Milk to Warm the Profits, Aug.-Sept., 1947
One Failure in 8 Years ..... Aug.-Sept., 1947
How to Choose a Haying Method ..... Oct., 1947
New Machines on the Farm Horizon ..... Oct., 1947
Research Begins on the Farm ..... Nov., 1947
Hay Crusher ..... Dec., 1947
Self-Feed Hay Dryer ..... Jan., 1948
Hay Finishers Prove Their Value ..... Jan., 1948

Fruit

Soil Management—Its Influence on Apple Tree Roots ..... Oct., 1946
Zinc Coated Nails Check "Little Leaf," Oct., 1946
The Fruit Garden ..... Jan., 1947
New Life for an Old Vine ..... Feb., 1947
Fighting Frost with Ice ..... Mar., 1947
Sell Your Black Walnuts ..... May, 1947
Infra Red Heat Cuts Cold Losses ..... Dec., 1947
Use of 2, 4D in Orchards ..... Jan., 1948

Fertilizers

Old and New Fertilizers ..... June, 1946
Production of Mulch Material ..... June, 1946
B Vitamins from Cow Manure ..... June, 1946
Phosphates in Their Working Clothes, Aug.-Sept., 1946
The Farmer's Wood Bank ..... Oct., 1946
Fertilizing for Yield and Soil Improvement, Dec., 1946
Fertility in a Hurry ..... Dec., 1946
Fertilizer Nitrogen from Various Sources, Mar., 1947
There's Money in Manure ..... May, 1947
Feed the Crops for High Yield ..... April, 1947
The Story of Fertilizer ..... July, 1947
Calcium vs. Magnesia in Agricultural Lime July, 1947
The Fertilizer Rate Problem ..... Aug.-Sept., 1947

INDEX

Hay

Cut Hay Right and Cut Feed Costs . . May, 1947
What's Wrong with Hay . . . . . July, 1947

Hogs

A Search for Better Hogs . . . . . April, 1947
Feed for the Pregnant Sow . . . . . April, 1947
Are Hybrid Hogs Coming? . . . . . April, 1947
Easy Way to Make Pork . . . . . June, 1947
Pointers on Pigs . . . . . July, 1947
Control of Necro . . . . . July, 1947
Multiple Farrowing . . . . . Aug.-Sept., 1947
Baby Pig Disease . . . . . Aug.-Sept., 1947
Improving the Hogs You Raise . . . . Oct., 1947
Benzene Hexachloride . . . . . Nov., 1947
Limited Feeding Pays Some Feeders Nov., 1947
Get 'Em Off to a Flying Start . . . . Dec., 1947
Feeding Prospective Herd Gilts . . . Jan., 1948
Creep Feeding Pigs Is Desirable . . . Jan., 1948

Horses

The Arab Horse . . . . . May, 1947
Group Riding in California . . . . . Nov., 1947

Insecticides

Fermate to Control Blue Mold . . . . Jan., 1947
No More Bugs to Bother Them . . . Feb., 1947
New Methods to Apply Concentrated Spray, April, 1947
New Insecticide for Cotton Growers Oct., 1947
No Flies in Iowa . . . . . Nov., 1947

Insects

New Life for Old Pastures . . . . . Feb., 1947
Hormones Reduce Insect Damage . . June, 1947
Now Pest Damage Can Be Predicted July, 1947
Destruction in the Dark . . . . Aug.-Sept., 1947

Pastures

Managed Pastures . . . . . June, 1947
Kentucky's New "Wonder Grass" . . June, 1947
"Airplane Poison" . . . . . July, 1947
Pasture Silage — Quality Feed . . . July, 1947
Rotation Grazing . . . . . Aug.-Sept., 1947
From Swamps to Pasture . . . . . Nov., 1947
Let's Remodel Our Pastures . . . . . Dec., 1947
Pastures Can Line Your Pockets . . . Jan., 1948

Poultry

Diagnosing Newcastle Disease . . . May, 1947
Is Range Rearing on the Way Out? May, 1947
New Ration for Chickens on Range May, 1947
Lime Treatment of Floor Litter . . . . June, 1947
Hens Go to Summer Camp . . . . . June, 1947
Limited Trapnesting . . . . . June, 1947
Don't Cull Those Broody Hens . . . . June, 1947
Heat — The Enemy of Egg Quality July, 1947
Artificial Control of Egg Production July, 1947
What "Hen Pecked" Means . . . . . July, 1947
One Man Egg Factory . . . Aug.-Sept., 1947
Bran Replaces Litter with Radiant Heat, Aug.-Sept., 1947
Feeding Ewes to Prevent Pregnancy Disease, Mar. 1947
Ten-Point Health Program . . . . . Nov., 1947
Deep Litter Saves Labor . . . . . Nov., 1947
What Will Formula 144 Do? . . . . . Dec., 1947
What About Limed Litter? . . . . . Dec., 1947
Study Your Chore Path . . . . . Jan., 1948
The Old Hen Question . . . . . Jan., 1948

Sheep

The Greatest Honor in Shepherd Craft, April 1947
Minnesota 100 — A New Sheep . . . . May, 1947
Lamb Production Project . . . . . June, 1947
And Now It's Sheep Fur . . . . . July, 1947
The Way to Get Fast Feathering . . Oct., 1947
Use Litter for Five Years? . . . . . Oct., 1947
Development of Targhee Sheep . . . Oct., 1947
Sheep Dog Trials . . . . . Nov., 1947

Soils

Cover Crops Help Save Soil Aug.-Sept., 1947
Building Better Soils Builds Better Cattle, Oct., 1947
Acid Metabolism Vital to Plants . . Nov., 1947
Lime—Foundation of Soil Fertility Nov., 1947
Rain Can Mean Riches or Ruin . . . . Dec., 1947
Extra Soil Fertility for Protein . . . Dec., 1947
How Much Lime? . . . . . Dec., 1947
Phosphorus: The Belle of the Soil . Jan., 1948
Fertilizer and Tillage Effects on Soil Jan., 1948

Forestry

Harvesting the Timber Crop . . . . . Feb., 1947
Direct Seeding Tool . . . . . Mar., 1947
Farm Wood Lots . . . . . May, 1947
Making New Chestnut Trees . . . . . July, 1947
Does Good Farm Forestry Pay . . . Oct., 1947

Weeds

Warrin' on Weeds . . . . . April, 1947
New Weapons in Fighting Weeds . . June, 1947
New Bindweed Control Method, Aug.-Sept., 1947
Flame Farming . . . . . Jan., 1948
No More Corn Plowing . . . . . Jan., 1948

Vegetables

Seed Growing—New American Industry, Mar., 1947
Farming in a Kentucky Cave . . . . April, 1947
Utilizing Vegetable Wastes . . . . . Dec., 1947
Potato "Sleeping Potion" Chemical . Jan., 1948

Miscellaneous

The Miracle of Our Food Production, Aug.-Sept., 1947
Nematodes and Nematocides Aug.-Sept., 1947
Purebred Salesmanship Aug.-Sept., 1947
What About New Buildings Aug.-Sept., 1947
Farming's History Unfolds Its Story . Oct., 1947
Indians and Early Agriculture . . . Oct., 1947
Transferring Farms within Families Oct., 1947
Wood Preservatives . . . . . Oct., 1947
Got a Muddy Pond? . . . . . Nov., 1947
"The Scottish Village" . . . . . Nov., 1947
Roofs for Farm Buildings . . . . . Nov., 1947
Ocular Demonstrations . . . . . Nov., 1947
The Spice of World Trade . . . . . Dec., 1947
Is Your Farm Safe from Fire? . . . . Dec., 1947
Is Farming a One-Man Job? . . . . . Dec., 1947
Reshaping New England Farm Land Dec., 1947
Care of Electrical Cords . . . . . Dec., 1947
Your Agricultural Statistician . . . Jan., 1948
How Deep a Well? How Big a Pump? Jan., 1948
Europe Needs Food . . . . . Jan., 1948
Purebred Salesmanship . . . . . Jan., 1948

AMONG THE NEW BOOKS

THE HORSE OF THE AMERICAS — By Robert Moorman Denhardt, editor of The Western Horseman; foreword by J. Frank Dobie.

This book tells the history of the Western Horse, and the part he has played in the development of the Americas. Here you have a fascinating account of the "Western Mount" from the time that Columbus planted the seed stock in the West Indies, through the period of the Conquest of both North and South America, to the cow horse of the late 19th century and the modern Quarter Horse. Breeds, types, strains and colors are discussed. Material is appended on the evolution of the Western saddle, brands, the rodeo, and the American Quarter running horse.

The Horse of the Americas is a beautifully printed book — contains over 300 pages of text, 20 pages of illustrations.

Publishers: The University of Oklahoma Press. Price $5.00.

JESSE BUEL—AGRICULTURAL REFORMER—Selections from His Writings. Edited with introduction by Harry J. Carmon.

Jesse Buel, a farmer's son and printer by trade, became one of the country's leading figures in the field of agriculture in the early nineteenth century. He worked tirelessly to develop better farming methods, and to bring greater educational opportunities to farmers. Much of his writing, some of his addreses to agricultural societies, and his book, **The Farmer's Companion**, have been gathered together in one volume by the Columbia University Studies in the History of American Agriculture. The book is tremendously interesting as it gives a valuable picture of the progress made in scientific farming, much of it by Jesse Buel.

Publishers: Columbia University Press Price $6.75

MANAGEMENT AND FEEDING OF SHEEP — By E. T. Baker.

This is a practical treatise on the selections, care, and breeding of sheep intended to meet the needs of farmer, flockmaster, and student of agriculture. In chapters covering (1) The Farm Flock, (2) Western Range Sheep, (3) Commercial Lamb Feeding, the three distinct types of sheep raising, as practiced in this country, are fully discussed. The book abounds in helpful suggestions for the successful treatment of the various diseases, ills, and accidents to which sheep are subject.

Publishers: Orange Judd Publishing Co. Price $3.50.

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